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EVALUATION OF THE NATIONAL TRENDS NETWORK'S SITE PLACEMENT DESIGN

by

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The National Acid Deposition Network/National Trends Network (NADP/NTN) consists of 200 wet deposition monitoring stations in the United States. Sufficient data has been collected to enable statistical analyses to be performed to determine if the site placement and numbers of sites are adequate to estimate temporal and spatial trends. Analysis of data from existing sites, assuming some sites were not present, and assuming additional sites were present were performed. Results showed that addition of new sites would not significantly increase the accuracy of concentration isopleths.

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ABSTRACT

An analysis of the National Trends Network's siting design was performed to evaluate network sensitivity, site redundancy, and regional representativeness of sites. The primary objective of the analysis was to quantify the Network's ability to detect changes in annual levels of sulfate, nitrate, and hydrogen ion deposition and concentration. In its current configuration, the network was found to be capable of detecting annual changes of 20-30% in regions bounded by four degrees of longitude and latitude.

Using data from several nationwide precipitation networks, spatial patterns of these constituents of acid precipitation were estimated in order to give a frame of reference for the analysis of network sensitivity. Spatial characterizations were also used to investigate the regional representative- of sites by assessing the conformance of individual site data with spatial patterns of deposition and concentration. In general, the sites chosen for the Network appear to be regionally representative, with only two sites showing any evidence of being influenced by local emissions sources. In addition, the analysis suggests that the National Trends Network provides reasonable coverage of spatial areas of interest, and there is no indication that redundant information is being captured by Network sites.

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INTRODUCTION

The purpose of this study was to evaluate the National Trends Network's siting design with respect to its adequacy in meeting NAPAP Task Group D objectives. Its main goal was to provide quantitative analyses which give insight into the network's ability to detect spatial and temporal trends in the chemical constituents of acid precipitation, focusing on the annual average concentration and total deposition of sulfate, nitrate, and hydrogen ions. The evaluation consists of the following components:

1. Spatial characterization of existing data to determine the areas of highest deposition and the magnitude of spatial gradients
2. Quantification of the network's sensitivity in detecting temporal changes
3. Assessment of the regional representativeness of sites
4. Examination of the network to assess any site redundancy

Spatial Characterizations

The objective of this analysis was to define geographic regions with high annual levels of deposition and/or concentration of acid rain constituents, specifically sulfate, nitrate, and hydrogen ions. In the eastern U.S. there are a sufficient number of monitoring sites to allow spatial characterizations of this region to be made using interpolation techniques. This is not, however, true for the western U.S. The topographic variability and sparse monitoring site coverage in this region make analysis of its data much more difficult. Interpolation procedures will produce potentially misleading isopleths in regions where there are no data, and therefore were not used to portray data from the western U.S. Instead, the available historical data were plotted on maps of the western U.S. to gain a sense of the magnitude of levels of acidic precipitation relative to eastern values. These data displays also provide a means to identify regions of high uncertainty where new monitoring sites might be located.

Quantification of Network Sensitivity

The primary goal of the evaluation was to gain an understanding of the network's ability to detect changes over time. Since most temporal comparisons are expected to be carried out in specific geographic areas, in this analysis the spatial area that the network encompasses was partitioned into smaller regions. Regional averages and their variances were estimated and used to assess the network's sensitivity in detecting temporal changes. The regions are defined as 4° x 4° grid cells across the U.S. The minimum detectable change in regional averages at varying levels of confidence was estimated for each region.

Evaluation of Regional Representativeness of Sites

Spatial characterizations of the available data were used to assess the regional representativeness of individual sites. For annual averages, spatial surfaces of deposition and concentration are expected to be reasonably smooth. Thus, the departure of site values from well defined gradients or consistent patterns can be used to identify sites that maybe non-representative. Local emissions sources as well as meteorological and geographic effects are among a wide array of potential explanatory variables that can account for site values that do not conform to smooth spatial pattern. Cross validation analysis, similar to residual analysis in regression problems, was applied in order to detect such departures. However, the magnitude of site deviations from the general pattern is merely circumstantial evidence and the factors related to non-representativeness must also be investigated.

Site Redundancy

Because of the high cost of operating monitoring sites, it is desirable to ascertain whether any sites could be eliminated without substantially reducing the sensitivity of the network. Although the addition of regionally representative sites will always increase network sensitivity, it is possible that one of a pair of sites might be removed without seriously affecting one's ability to monitor trends. In an effort to identify redundant sites, correlations of weekly concentration and deposition values from pairs of sites were estimated. If site measurements were highly correlated on a weekly basis, this was taken as evidence that each of the pair of sites is providing the same information.

DESCRIPTION OF DATA BASE AND DATA ANALYSIS METHODS

Data Base

Data used in spatial characterizations and estimation of spatial correlation and variance structures were gathered and summarized by the Acid Deposition System (ADS), an acid rain data base operated by Pacific Northwest Laboratories for the U.S. Environmental Protection Agency (Olsen and Watson, 1984).

The data base includes data from:

- NADP (National Atmospheric Deposition Program)
- MAP3S/PCN (the MAP3S Precipitation Chemistry Network)
- CANSAP (Canadian Network for Sampling Precipitation)
- APN (The Canadian Air and Precipitation Monitoring Network)
- EPRI/SURE (EPRI Sulfate Regional Experiment Precipitation Chemistry Monitoring Program) Eight ceased operation in 1981. Five sites became UAPSP sites.

- UAPSP (Utility Acid Precipitation Study Program).
- APIOS (Acid Precipitation in Ontario Study)

For most of the analyses that are performed in this report, annual data are used. Concentrations are given as volume-weighted averages (mg/l) while deposition represents a total over the year (g/m^2). In order to obtain reasonable spatial characterizations and spatial variance estimates, it was necessary to exclude monitoring sites that had too few individual samples to constitute a valid annual average or total. Four sampling representativeness criteria were used to screen stations for the analysis. They were:

1. Percent Precipitation Coverage Length (PPCL) - the percent of the days in the year for which valid precipitation measurements are available.

2. Percent Total Precipitation (PTP) - the percent of the total precipitation that occurred during valid sampling (i.e., when good samples were taken) to the total measured precipitation. This figure would be low, for example, if there were significant rainfall while the samplers were inoperative.

3. Percent Valid Sampling Length (VSL) - the percent of the year during which valid sampling could occur whether it rained or not. This is 100 minus the percent of the time the collector was known to be inoperative.

In addition, a fourth criterion, Percent Collection Efficiency (PCE), was used to judge the quality of the sample. PCE is the ratio expressed as a percent of the total sample volume for the year (expressed as a depth) to the total yearly depth measured in the recording rain gage colocated with the collector. It is a measure of the quality of the site, the maintenance of the collector (and gage) and an indication of unusually high winds or snowfall with affect collector performance. For this study the criteria used to accept annual averages from a station are:

PPCL	>	90%
PTP	>	75%
VSL	>	75%
PCE		75% to 115%

These criteria were selected in order to choose stations with enough data to adequately characterize annual deposition or concentration. The criteria were relatively stringent, resulting in the rejection of 40% of the stations in 1980, 25 to 35% in 1981-1983, and 20% in 1984. Since we were most interested in accurately portraying annual spatial patterns, it was essential to eliminate values from sites with incomplete or misleading data.

These screening criteria were applied to annual data from eastern North America (east of 94 degrees west longitude) resulting in the following numbers of sites available for analysis.

	1980	1981	1982	1983	1984
Sites from All Networks	43	70	96	101	62

The relatively small number of monitoring stations in 1984 is due to unavailability of data from Canadian networks at this time (some cutoff date had to be made) rather than a reduction in monitoring activity.

In the analyses that follow, historical data from the NADP network were used to assess regional representativeness and redundancy of NTN sites that are currently in operation. The number of NADP sites in eastern North America available for the analysis is shown below:

	1980	1981	1982	1983	1984
Total Eastern NADP Sites	51	58	63	82	101
Sites That Passed Screening Criteria	15	34	45	44	53
% of Sites That Passed Screening Criteria	29	59	71	54	52

National Trends Network Sites

The design of the National Trends Network has been an evolutionary process. The configuration used in this analysis is depicted in Figure 1 and site names and locations are given in Table 1.

Spatial Analysis Methods - Kriging

In investigating spatial and temporal trends in acid precipitation, it is desirable to have a visual means to represent geographic patterns. Isopleth maps were used to provide characterizations of concentration and wet deposition of sulfate, nitrate, and hydrogen ion over eastern North America for each of the years 1980-1984. These maps are a powerful way to portray the general spatial features of the data, but should be used judiciously. It should be understood that there is uncertainty (error) in the location of an isopleth due to random variations in the data on which it is based. Just as a sample mean imperfectly estimates the population mean, a group of isopleths imperfectly represents the true response surface associated with a spatial variable. Unfortunately, most mapping techniques for producing isopleths are incapable of reflecting the imprecision in the location of the isopleths due to their reliance on interpolation and smoothing algorithms which fail to quantify and utilize measures of data variability.

In order to redress these problems, an interpolation method known as kriging was used to provide a representation of the geographic pattern of acid precipitation. Unlike most other interpolation techniques, kriging uses the inter-site correlation in the data to determine the weights that are applied to measured values in estimating unknown values. It also quantifies interpolation error thereby providing a measure of the uncertainty in isopleth maps that are derived from kriging estimates. Kriging is actually a family of "geostatistical" estimation procedures. It was named for a South African mining engineer, D.H. Kreig, and has been used primarily in the mining industry. However, this methodology is becoming increasingly popular in other fields (see Barnes, 1980, for descriptions). It has been found to be a particularly useful tools for analyzing spatial trends in acid precipitation data (Finkelstein and Seilkop, 1981; Eynon and Switzer, 1982; Finkelstein, 1984; Bilonick, 1983; Seilkop, 1986; Seilkop and Finkelstein, 1987).

All kriging techniques rely on a model of the spatially- and possibly temporally-related covariance structure of the data under analysis. In simple kriging, which will be used in this paper, spatial variability is modeled by the semi-variogram, a function which relates the covariance of station-to-station differences to the distance between stations. A typical variogram is displayed in Figure 1. Its positive slope reflects decreasing correlation between data as the distance between monitoring sites increases. The value of Gamma at zero distance can be interpreted as the underlying error in the measurement process (Finkelstein op. cit.). Several general models for variograms have been proposed (see Delhomme, 1979 for details). In this example, a curved line would be used.

Several forms of kriging (e.g. universal, generalized covariance) have been developed to remove the effect of systematic (nonrandom) variation on the estimation of the spatial covariance structure. Simple kriging, however, is based on the assumption of a locally stable mean. Consequently, a variogram which contains some systematic (trend) components can lead to inflated estimates of interpolation error. However, the estimation bias is not serious under moderate spatial trends (Journel and Huijbregts, 1978; Seilkop, 1986). In an effort to understand the extent and effect of trends on variogram estimation, overall and directional (N-S, E-W, NE-SW, NW-SE) variograms were estimated for deposition and concentration of sulfate, nitrate, and hydrogen ion. In this analysis, the overall nondirectional variograms were employed in the calculation of all kriging interpolation weights and variances as the directional changes were not large enough to substantially alter either pattern or variance estimates. In all cases, either straight or curved variogram models were utilized.

In order to characterize acid precipitation, the available monitoring site data were used to obtain kriging estimates of values at 500 regularly spaced grid points across eastern North America. These estimated values define a relatively smooth surface which retains the primary features of the data.

Method for Estimating Network Sensitivity

One of the most attractive aspects of kriging is its ability to quantify uncertainty in interpolation estimates. It provides either point or regional mean estimates and their variances, and can be used to obtain uncertainty estimates for any configuration of sites. In order to assess the network's ability to detect temporal changes, the variances estimates for regional means estimated by kriging were utilized. The spatial domain of the continental U.S. was partitioned into $4^{\circ} \times 4^{\circ}$ grid cells and confidence limits on mean values were estimated. However, rather than calculating the estimation variance directly from the variogram of actual values, a relative variogram was estimated as:

$$\gamma_h = \frac{\mathrm{Var}\,(X_i - X_j)}{\left[\dfrac{(X_i + X_j)}{2}\right]^2}$$

where Var = Variance

X_i, X_j are data values separated by distance h

When this variogram is used, the standard deviation of an estimated mean regional value becomes a coefficient of variation, i.e. the standard deviation divided by the mean. Since these errors are estimated relative to the mean, they can be used to accurately estimate the relative error irrespective of the mean value.

The basis for this measure lies in the assumption that the degree of variability in data values is directly related to the mean. This hypothesis was shown to be reasonable in two ways. First, when variograms were estimated in regions with different mean values, there was more consistency among "relative" variograms than those estimated directly from the data with no scaling. Secondly, the "relative" empirical variogram was smoother than its actual scale counterpart, bringing about improvement in the fit of the theoretical variogram.

One of the advantages of the relative variogram approach is that if the relationship between spatial variability and scale is the same in the western U.S. as in the east, relative error estimates can be made there as well. In assessing the sensitivity of the network the following approach was used:

1. Relative variograms were estimated for annual sulfate, nitrate, and hydrogen ion deposition and concentration from all sites in the eastern U.S. (east of 94° longitude West) that met the screening criteria discussed above.

2. Relative 90% and 95% confidence limits were computed as

   $$\pm Z \quad 2^{1/2} \text{ (Relative error variance)}^{1/2}$$

   where $Z = 1.96$ for 95% limit
   $= 1.65$ for 90% limit

   This formulation is used to simulate the comparison of values between two years, and represents the minimum relative deviation between two years' annual values that can be detected at the specified level of confidence.

3. Maps of these values were produced for the existing National Trends Network. In addition, the following situations were depicted:

   a. Existing National Trends Network + Canadian sites as of 1983.

   b. Existing National Trends Network deleting one site from each grid.

   c. Existing network plus one site per grid.

   d. Existing network plus five sites per grid.

   e. NADP sites which met the screening criteria in 1982.

RESULTS AND DISCUSSION

Spatial Characterizations - Eastern North America

The results of statistical interpolation (kriging) of monitoring site data from eastern North America (east of 94° longitude West) are presented in Figures 3-5. These figures and the following discussion concerning spatial/temporal trends in eastern North America are taken from Seilkop and Finkelstein (1987).

Considering the sulfate deposition maps first (Figure 3), we see that isopleths generally have a SW to NE major axis, with a maximum centered between Northern Ohio and Southern Ontario in the vicinity of Lake Erie. There is also some evidence of gradient of both sulfate deposition and concentration that crosses the southern Appalachians across Virginia and North Carolina. It can be seen from Figure 3 that there seems to be a general decrease in sulfate deposition between 1980 and 1983, with perhaps a slight increase in 1984. Both the peak level, and the area of generally higher levels around it decreased about 15% in the 80-83 period. Another way to consider this is to note that the area enclosed by an isopleth, for example, the 3.0 g/sq.m isopleth, decreased substantially over this period.

Interestingly, the levels where there are measurements far away from the peak (which may arguable be considered quasi-background) don't seem to have changed much from year to year. This seems to be the case for all the other sets of maps as well. With the exception of 1984, the sulfate concentration patterns are remarkably similar to the sulfate deposition patterns for all years. As with deposition, the decrease in concentration from 1980 to 1983 is quite evident. This consistency between concentration and deposition patterns is also evident for nitrogen and hydrogen and seems to indicate that variation in rainfall amounts over large areas may not have a significant effect on the spatial patterns.

The nitrate deposition patterns are, in general, quite similar to those of sulfate deposition, if perhaps a bit smoother. Over the 1980 to 1983 period, nitrate also shows a decrease of 15 to 20% in areas of high deposition and concentration. One noteworthy difference between the sulfate and nitrate patterns is that the nitrate maximum seems to be displaced slightly to the North and East. It's not at all clear that this is real, but is somewhat consistent with the distribution of precursor emissions which also have a maximum farther to the east (Engineering Science, 1980).

The nitrate concentration maps again show similar patterns to the deposition maps, and a similar trend between 1980 and 1983. The isopleths are quite a bit smoother than those for sulfate concentration, perhaps reflecting the wide distribution of sources such as automobiles.

The hydrogen ion deposition maps would be expected to be very similar to those for sulfate and nitrate, and indeed they are. Perhaps it is a bit surprising that while their general shape and temporal trend is similar, the maxima appear to be shifted south and east of both the nitrate and sulfate maxima. 1983 especially seems to show a strong shift to the east which is not seen in either of the other maps. No explanation for this change has proved satisfactory at this time. We also note that the 1984 pattern has its major axis shifted more to a North-South orientation, similar to the sulfate pattern in this year.

Again, the hydrogen ion concentration maps are remarkably similar to those of hydrogen deposition, although the maximum is somewhat further north, and also looks quite similar to the sulfate concentration maps. The 1983 maximum does not show the shift to the east seen in deposition.

Spatial Characterizations - Western U.S.

Data values from the western U.S. for the years 1981-1984 are mapped in Figures 7-18. In order to give a frame of reference for the values in the West, they will be compared to the lowest values from the eastern U.S. In the extreme souteastern part of the country, average annual sulfate concentration values have been between 1.5 and 2.0 mg/l and annual deposition values around 2.0 g/m^2 for the years 1980-1984 (Figure 3). Thus, at most of the western monitoring sites where data were collected, annual sulfate deposition appears to be approximately 15-25% of the levels observed in the extreme southeastern part of the U.S. However, in Washington and Oregon, there was some evidence to suggest that deposition is somewhat higher, perhaps close to 50% of values in the southeast. Sulfate deposition in east Texas and areas directly north of it was from 70-100% of that observed in the southeast. The relatively high deposition in Washington and Oregon was apparently primarily related to the large amounts of precipitation that these regions receive; sulfate concentration values in the northwest were consistent with those of California and considerably less than those of Colorado, Wyoming and New Mexico. For those states, average annual sulfate concentrations were about 50-70% as large as those of the lower southeast.

Nitrate deposition was relatively constant across most of the West. Most of the values were between 0.20 and 0.60 g/m^2, increasing to approximately 1 g/m^2 in east Texas and areas north of it. Thus, most the annual nitrate deposition values were 20-60% of those observed in the Southeast. The majority of the nitrate concentration data were more variable. Typical values for northern California, western Oregon, Washington, and Montana were 0.20-0.40 mg/l. However, annual averages for the rest of the region ranged between 0.70 and 1.2 mg/l, levels that were compatible with those observed in the Southeast between 1980 and 1984.

Hydrogen ion deposition and concentration were similar in relative spatial pattern to sulfate concentration and deposition. The levels of deposition and concentration were 10-25% of those in lower Southeast.

Network Sensitivity Analysis

The main purpose of this analysis was to evaluate the National Trends Network's ability to detect temporal changes in mean values for the 4° x 4° grid cells depicted in Figure 19. In summarizing results, these cells were aggregated into the regions depicted in Figure 20. The results of the sensitivity analyses are presented in Figures 21-44. They portray several scenarios under which the network's sensitivity is assessed. The first map for each substance (both concentration and deposition) shows the smallest change between two years that the network is able to detect at the 95% confidence level. Consider for example, sulfate deposition in the cell containing southeastern Ohio, eastern Kentucky, and western West Virginia, i.e. the cell bounded by 80° and 84° longitude and 37° to 41° latitude (Figure 21). If the sulfate values in two different years differed by more than 17.9%, there would be strong evidence that the average deposition for sites within the cell was indeed different across the two years; only 5% of the averages obtained from the network in any two years would differ by more than this amount if the actual (but unknown) mean deposition was identical for the two years. Thus, 17.9% is the minimum difference that the network can detect in this cell at the 95% confidence level.

A formal analysis of trends would not, of course, be based on only two years' data. Instead, several years as a time series would be analyzed. However, for the purpose of assessing network sensitivity, the minimum detectable difference is a useful construct. It simplifies the analysis by obviating the necessity of dealing with different types of trends (e.g steady decline versus sharp dropoff and constant level thereafter), and the amount of time over which the trend occurred. A summary of the minimum detectable differences between two annual values (network sensitivity) in cells within geographic regions is given below:

Average and Range of Network Sensitivity
(Minimum Detectable Changes in Percent)
at 95% Confidence Level by Geographic Region

Substance	Mid-east		Northeast		Southeast		West	
	avg.	(range)	avg.	(range)	avg.	(range)	avg.	(range)
Sulfate (dep.)	24	(18-43)	36	(17-51)	25	(19-31)	28	(21-48)
(conc.)	21	(19-39)	36	(13-53)	21	(15-26)	25	(17-50)
Nitrate (dep.)	26	(19-48)	40	(18-56)	26	(21-34)	25	(25-53)
(conc.)	31	(22-55)	49	(21-69)	31	(24-40)	36	(27-65)
Hydrogen Ion								
(dep.)	25	(18-46)	40	(17-56)	26	(19-32)	29	(21-54)
(conc.)	23	(13-47)	43	(12-69)	22	(15-29)	28	(17-64)

The minimum detectable difference limits for 90% confidence are approximately 84% (1.645/1.96) of these limits. Thus, in the Mid-east, the network is capable of detecting a 15% change in annual sulfate deposition (Figure 21). From the maps, it is clear that in the Mid-east, the lowest network sensitivity is in northern Ohio and eastern Michigan grids. However, the sensitivity limits for these areas are inflated since a significant portion of the grid area is composed of Great Lakes areas. In addition, the grids contain part of southern Ontario, where there are no NTN sites, Figure 21. However, several Canadian monitoring sites are in operation there. Augmenting the NTN with these sites in the grids appreciably increases the network sensitivity in northern Ohio and eastern Michigan. The reductions in minimum detectable changes are reflected in the following table:

Network Sensitivity in Mid-East Region,
Including Canadian Sites

Substance	Range of Minimum Detectable Differences
Sulfate (dep.)	18-23%
Sulfate (conc.)	14-21%
Nitrate (dep.)	19-25%
Nitrate (conc.)	22-30%
Hydrogen Ion (dep.)	18-22%
Hydrogen Ion (conc.)	13-19%

Some care should be exercised in using the summary numbers presented thus far. First, all of the upper limits for the West come from the grid containing the middle section of western California (120°-124° longitude West, 33°-37° latitude North). This grid also contains a significant amount of ocean and the estimate is inflated because of this edge effect. Estimates are similarly inflated for one eastern grid (72°-76° longitude West, 37°-41° latitude North) and extreme southwestern grids which contain parts of Mexico.

In addition, for most of the West, the minimum detectable differences may be underestimated. The estimation of these values is based on spatial variability estimates from the eastern U.S. and these may be inappropriate for the West. The variation in topography and climate in the West may have enough influence to induce increased spatial variability relative to that observed in the East. Unfortunately, the western data are not numerous enough to investigate these potential differences in variability. Thus the estimates of minimum detectable differences in the western region should be viewed as a "best case."

One question that might be asked of the network is how a reduced number of sites affects network sensitivity. To better understand this, one site was deleted randomly from all grids, and 95% confidence limits were estimated. The effect of these deletions on network sensitivity is summarized below. The values that are reported reflect the decrease in the minimum detectable differences at the 95% confidence level for each cell. Thus, for sulate deposition in the Ohio, Kentucky, West Virginia cell (Figures 21, 22) the deletion of one point results in a reduction in sensitivity of 1.6% (from 19.5% to 17.9%).

Average and Range of Decreases in Network Sensitivity (%)
through Deletion of One Site Per Cell

Substance	Mid-east	Northeast	Southeast	West
	avg. (range)	avg. (range)	avg. (range)	avg. (range)
Sulfate				
(dep.)	2.7 (0.3-6.3)	1.3 (0.1-3.1)	3.8 (0.7-9.0)	10.6 (2.3-28.2)
(conc.)	2.8 (1.8-6.9)	1.4 (1.0-3.9)	4.3 (0.5-11.2)	12.5 (1.9-36)
Nitrate				
(dep.)	3.0 (0.2-7.0)	1.5 (0.1-3.4)	4.3 (0.7-10.3)	12.0 (2.4-32.8)
(conc.)	3.7 (0.3-8.7)	1.8 (0.5-4.5)	5.4 (0.9-13.2)	15.3 (2.9-42.3)
Hydrogen Ion				
(dep.)	3.5 (0.5-7.6)	1.8 (0.2-4.0)	4.8 (0.9-11.4)	12.9 (2.8-34.9)
(conc.)	3.0 (0.2-9.5)	1.8 (0.5-5.9)	5.8 (0.4-1.7)	17.4 (1.9-52.1)

These values may at first seem small, but represent a considerable reduction in sensitivity relative to the minimum detectable changes estimated from the base network. For example, in estimating sulfate deposition, the 2.7% average decrease in sensitivity that arises from deleting one site in each Midwestern cell is in reality a 11% (2.7/24) average reduction in network sensitivity. In the West, the deletion of sites at the rate of 1 per cell results in average loss of 38-50% of the network's sensitivity. However, because of the siting density in the Northeast, a reduction of only about 4% is realized. For the Southeast, the loss of one site per cell would result in an approximate loss of 15-20% of the network's sensitivity.

Based on these values, it would appear that the estimation of northeastern values would suffer the least from a loss of sites, because of the relatively high siting density there. However, even with the addition of Canadian sites, estimates of the average value for northern Maine are accurate to only ±35-60% for sulfate, hydrogen ion and nitrate deposition and concentration. For the Mid-east and Southeast, the largest reductions in sensitivity from deletion of a site occur as would be expected in areas of lowest site density, i.e. the extreme north of the Mid-east region, and the lower part of the South.

As well as asking what is lost by deleting sites, it may be of interest to determine the gains that can be achieved by adding sites. To this end, sites were added to each grid in a random fashion. In the first case, a single site was added to each cell. A subsequent evaluation was then performed on five randomly added sites per cell. Clearly, this is not an optimal way to increase network sensitivity, since by chance a site could be positioned close to an existing site. However, the technique gives a lower limit for the increase that could be obtained by optimizing the spatial positioning of a new site. Summaries of the results of the two augmentations of the network are given below:

Average and Range of Increases in Network Sensitivity (%) through Addition of One Site Per Cell

Substance	Mid-east	Northeast	Southeast	West
	avg. (range)	avg. (range)	avg. (range)	avg. (range)
Sulfate				
(dep.)	3.0 (1.9-6.0)	9.6 (2.1-17.0)	3.1 (1.9-11.3)	4.6 (1.6-17.4)
(conc.)	1.8 (0.3-2.2)	9.7 (0.1-21.1)	2.4 (1.1-6.1)	4.4 (0.2-20.2)
Nitrate				
(dep.)	3.1 (1.7-6.8)	11.0 (2.0-19.7)	3.2 (1.1-6.7)	5.0 (1.5-19.7)
(conc.)	3.7 (1.9-8.7)	14.0 (2.2-25.6)	3.9 (1.2-8.2)	6.1 (1.6-25.1)
Hydrogen Ion				
(dep.)	3.1 (1.6-7.2)	11.6 (1.8-18.5)	3.2 (1.0-6.8)	5.1 (1.4-20.5)
(conc.)	3.0 (0.5-11.0)	16.0 (0.8-31.6)	3.2 (0.3-7.9)	6.1 (0.2-28.2)

Average and Range of Increase in Network Sensitivity (%)
through Addition of Five Sites Per Cell

Substance	Mid-east		Northeast		Southeast		West	
	avg.	(range)	avg.	(range)	avg.	(range)	avg.	(range)
Sulfate								
(dep.)	6.7	(3.3-11.6)	18.1	(4.3-28.4)	7.7	(4.9-12.1)	10.7	(5.3-27.9)
(conc.)	6.1	(2.1-13.7)	20.3	(3.2-32.5)	7.0	(3.5-10.8)	10.7	(3.7-30.9)
Nitrate								
(dep.)	7.0	(2.1-13.7)	20.2	(4.3-31.8)	8.1	(4.9-12.6)	11.6	(5.3-30.8)
(conc.)	8.5	(3.4-16.6)	25.4	(5.0-39.8)	9.8	(5.7-14.9)	14.3	(6.1-38.4)
Hydrogen Ion								
(dep.)	6.9	(2.7-13.4)	20.7	(3.7-32.7)	7.9	(4.4-12.2)	11.6	(4.8-31.4)
(conc.)	7.0	(1.7-19.3)	27.3	(3.1-46.5)	8.0	(2.8-13.6)	13.3	(3.1-43.2)

These results should be interpreted carefully. First, it is important to note that much of the average increase in the average sensitivity for the Northeast occurs in the cell that contains eastern Maine and a substantial part of New Brunswick, Canada; therefore the average for the increase in region sensitivity is overestimated. However, this overestimate is not so serious if the results are interpreted in light of the network's current sensitivity. Thus, an addition of one site per cell in the Mid-east results in an increase in sensitivity of 9-13%. Similarly, the increases for the other regions are as follows: Northeast - 25-37%, Southeast - 12-15%, West - 15-20%. The addition of five sites per cell brings about a doubling of these average increases.

Thus far, we have seen that over much of the U.S., the National Trends Network is capable of detecting 20-30% changes in annual deposition and concentration of sulfate, nitrate, and hydrogen ion. However, this presumes that all the monitoring sites will supply sufficient samples to constitute a valid annual average or total. If a large amount of data from sites must be deleted because of quality assurance deficiencies, the network's sensitivity can be severely impacted. To show the effect of quality assurance failures, the network sensitivity was assessed with NADP data from 1982. During this period, 45 of 63 sites provided data which met the screening criteria discussed in the description of the data base. This was the best of the years 1980-1984 in terms of percentage of sites meeting data quality criteria. The decrease in network sensitivity for these sites is shown below:

Average Decrease in Network Sensitivity (%)
Using Quality Assured NADP Data from 1982

Substance	Mid-east		Northeast		Southeast		West	
	avg.	(range)	avg.	(range)	avg.	(range)	avg.	(range)
Sulfate								
(dep.)	6.0	(0.3-12.4)	1.8	(0.0-5.3)	11.9	(3.1-20.5)	20.0	(4.9-43.2)
(conc.)	4.8	(0.9-9.1)	2.0	(0.4-4.1)	10.3	(2.5-17.4)	16.7	(4.5-34.3)
Nitrate								
(dep.)	5.5	(0.9-10.7)	2.1	(0.5-18.3)	11.7	(2.9-19.8)	19.1	(5.0-39.7)
(conc.)	7.1	(0.9-14.0)	2.5	(0.8-6.15)	14.8	(3.7-25.1)	24.3	(6.2-51.1)
Hydrogen Ion								
(dep.)	5.9	(0.7-11.5)	2.1	(0.7-5.0)	12.1	(3.1-20.6)	18.8	(5.1-41.8)
(conc.)	8.6	(0.0-19.4)	2.2	(0.0-8.1)	16.6	(4.4-28.4)	26.5	(6.2-61.9)

Interpretation of these results must take into account the increases in sampling density in the Southeast between 1982 and the present. However, mideastern and northeastern sampling densities have not changed appreciably. From these results for those regions, we see that failure to achieve quality assurance goals can result in large losses in network sensitivity. For the Mid-east and Northeast, 20-25% of the potential network sensitivity resulted from loss of data due to failure to meet data quality objectives.

Regional Representativeness of Sites

The designers of the National Trends Network attempted to choose sites to ensure that the data accumulated by the network were representative of regions within the U.S. The selection of sites was based on obtaining adequate representation of ecoregions while at the same time trying to capture major spatial gradients. One of the primary considerations was to avoid sites that could be influenced by large local emissions sources. This design criteria was used to avoid "hot spots" that would distort characterizations of larger scale spatial patterns.

In order to assess whether historically operating NADP sites satisfy the goal of accurately portraying large scale spatial patterns, a cross validation analysis was undertaken. Each annual NADP site value was estimated from data at 10 neighboring sites. Kriging was used to obtain the weights that were applied to the neighboring data for each estimate as well as the interpolated point's estimated error. Approximately 65% of the data should fall within one standard error of the estimated point and 95% should be within two standard errors. If a point falls outside of these limits there is some evidence to suggest that it deviated from the larger scale spatial pattern, and may be "unrepresentative". If the actual value is higher than the upper confidence limit, it may be reflecting the influence of a local emissions source. A low deposition value may suggest that precipitation at the site is lower than that normally found in the region in which it resides. If either of these patterns persists over time there is reason to believe that the site may be "unrepresentative".

The results of the individual cross validation analyses are given in the Appendix. Unfortunately, the screening procedure severely reduces the amount of data available for the analysis, as seen in Tables 2-7. However, these tables also indicate sites that deviate from the estimated patterns of deposition and concentration. Table 8 summarizes this information as the proportion of years (1981-1984) in which a site deviated by at least one standard deviation from its cross validation confidence limit. Most sites are within the prediction limits estimated by the cross validation kriging analysis, and therefore give little evidence of being "unrepresentative." Even when the lenient criterion (actual value greater one standard error of predicted value) was used to screen the data, there are very few sites that show consistent over or underestimation consistently across years. Sites with values which exceeded estimated confidence limits in 50% or more of the monitoring years for more than one component (deposition or concentration of sulfate, nitrate, hydrogen ion) are indicated in Table 8 by an asterisk. Regionally unrepresentative precipitation and the influence of local emissions are among a number of plausible explanations for sites deviating significantly from the large scale spatial pattern. The following examination of the individual sites discusses only the role that precipitation and emissions might play, fully recognizing that the observed deviations could be related to other factors.

Argonne, Illinois:

Deviations were primarily for deposition and not concentration. All deviations were at the 65% level, and included both exceedances of both lower and upper 65% confidence limits. It is therefore unlikely that the site is unduly influenced by emissions sources, and may have high precipitation variability relative to other Illinois sites.

Aurora, New York:

All deviations were exceedances of the upper 65% confidence limit. These differences are not substantial enough to declare the site "unrepresentative".

Bennett Bridge, New York:

For sulfate deposition, all deviations were exceedances of the upper confidence limits. For sulfate deposition, one of the two exceedances was at the 95% confidence level, and for nitrate deposition both exceedances were at the 95% level. The single deviation for nitrate concentration was an exceedance of the upper 65% confidence limit. Since concentration for this site appears to fall within reasonable limits for all substances, it would seem that the deposition exceedances relate to high precipitation values. Thus, it may be worthwhile to investigate the relationship of annual precipitation at Bennet Bridge to precipitation at NWS sites that are nearby.

Coweeta, North Carolina:

The observed deviations are below the lower 65% confidence limits for sulfate and hydrogen concentration. This appears to be part of a gradient across the southern Blue Ridge Mountains.

Caldwell, Ohio:

In three of four years hydrogen ion concentrations at this site exceeded the 65% upper confidence limit. Both sulfur concentration deviations were exceedances of the upper confidence limit, one at the 95% level. Therefore, there is some evidence to suggest that this site may be influenced by local emissions sources, and the proximity of sources should clearly be investigated.

Elkmont, Tennessee:

All deviations are below the 65% lower confidence limits. Since the deviations are for concentration as well as deposition, it would appear that the deviations are reflecting a spatial gradient rather than unrepresentative siting.

Walker Branch, Tennessee:

All deviations are exceedances of the upper confidence limits. For hydrogen ion deposition the single exceedance is at 95% confidence. For hydrogen ion concentration, one of the deviations is also at the 95% level. Although only two of four years show systematic differences from the spatial pattern, there is some indication that the deviations are larger than might be expected. It therefore may be prudent to investigate the proximity of local emissions sources.

Parsons, West Virginia:

All deviations were exceedances of the upper confidence limits. One of the exceedances for sulfate deposition was at the 95% confidence level. However, since the exceedances were for deposition, and not for concentration, the results are probably related to precipitation variability. Since the deviations occurred in only two of the four available years, precipitation is probably not systematically higher for this site than the surrounding region.

In summary, the analysis indicates that existing NADP sites are generally representative of regional values. There was some evidence to suggest that Bennett Bridge, New York precipitation may exceed the regional average, thereby inflating deposition estimates. In addition, there is evidence to suggest that Caldwell, Ohio and Walker Branch, Tennessee are influenced by local emissions sources. A discussion with the Director of the NADP/NTN central analytical lab at the Illinois State Water Survey (Stensland, 1987) confirmed that he too had noticed that these three sites had higher deposition values than might be expected from neighboring sites. However, he was only able to identify a probable cause for the high values at Walker Branch, Tennessee, which has a power plant located within 20 miles. In addition, he suggested that Aurora, New York may be influenced by a power plant located to the south of the site. The lack of simple explanations for the remaining sites that were identified as having deviated from the large-scale spatial pattern is not conclusive evidence that they are indeed regionally representative. These sites should be more carefully examined to determine if they are somehow atypical of the region they have been chosen to represent.

Site Redundancy

The network sensitivity analysis gave fairly strong evidence that for some geographic regions there are no redundant sites. This is true in the Southeast and West, where elimination of a site from the relatively small number of sites results in large losses in sensitivity. There is, however, an indication that from a purely spatial perspective, the location of some of the sites is less than optimal. This can be seen through a comparison of the differences in sensitivity that arise from random deletion and addition of one site (pages 10, 11). If the sites were in nearly optimal locations with respect to maximizing network sensitivity, the decrease in sensitivity from deletion of a site should be larger than the increase in sensitivity realized by adding a site. This follows from an assumption of independent data that would suggest that the standard deviation of an estimated mean decreases by the reciprocal of the square root of the number of values from which it is estimated. Thus, increasing the number of sites on which a regional mean is based from four to five would result in an increase of sensitivity of .038 ($5^{-1/2} - 4^{-1/2}$) times the underlying standard deviation. Reducing the number of sites from 4 to 3 results in a decrease in sensitivity of 0.135 times the underlying standard deviation. These factors apply to independent data; however, for spatially correlated data like those in the NTN the difference would be even larger. The expected relationship between increases and decreases in sensitivity arising from the addition or deletion of a single site holds only for the Western region. In the Mid-east and Southeast, the increases and decreases are roughly equivalent. In the Northeast it would appear that the increase to be gained by adding a site far outweighs the decrease resulting from the loss of one. However, much of this disparity relates to an artifact of this analysis, namely the "edge effect" that affects interpolation estimates when data are unavailable on all sides of an interpolated value. In the one cell that is not seriously affected by this artifact (eastern New York, Vermont, western Massachusetts, and Connecticut), the increase in sensitivity that occurs by adding a site is also greater than the loss in sensitivity arising from the deletion of a site. This is the result of the non-uniform distribution of sites in the Northeast. An equidistant (uniform) spacing of sites is the mathematically optimal scheme for estimating the regional average, and departures from it can bring about results like those found in the Northeast.

The results of the analysis of the effects of adding and deleting sites from the Northeast region points to the weakness inherent in using spatial statistical arguments to evaluate site placement. This type of analysis does not address the adequacy of ecosystem or precipitation representation in site locations. The designers of the National Trends Network felt that the inclusion of these factors in the site selection criteria was more important than obtaining an optimal spatial configuration. However, the analysis performed in this study would suggest that spatial configuration is also an important design criterion. Where there are choices between sites with similar characteristics for the primary siting criteria (avoidance of local emissions sources, susceptible ecosystems, existing deposition data, etc.), and the differences between candidate sites on these criteria are minimal, maximization of intersite distances should also be considered as a siting criterion.

Another way to attempt to identify redundant sites is to examine the available short temporal scale data that are collected from them. If there is a high degree of correlation between the data collected from two sites, there is evidence that they are providing redundant information. This was done for weekly sulfate deposition and concentration data from NADP sites from 1980-1984. The correlations between sites are shown in tables 9-11. From these results, there is little evidence to suggest redundancy between sites; all correlation values are less than 0.72 with the majority less than 0.40. Thus, in pairs of sites, the maximum amount of variation in one site that can be explained by the other is only about 50%.

SUMMARY AND CONCLUSIONS

This analysis suggests that the National Trends Network is a reasonably powerful tool for detecting temporal changes in the annual average concentration and deposition of sulfate, nitrate, and hydrogen ions. In its current configuration, the network appears to be capable of detecting 20-30% changes in annual mean values for regions bounded by four degrees of longitude and latitude on a side. In the eastern U.S., where these regions generally contain at least three NTN sites, the loss of one site in each region would result in a loss of up to 20% of the network's sensitivity in some regions. In the West, where the monitoring density is lower, the loss of one site per region would bring about a decrease in network sensitivity of up to 40%. Thus, in order to detect changes in levels of acid deposition and precipitation acidity, it is essential to obtain data from all the monitoring sites in the network. The current number of sites appears to be adequate to assess temporal changes. However, the analysis suggests that the number of sites is not large enough to allow sites to be excluded from an assessment of changes because of poor data quality.

In addition to having reasonable sensitivity, the results of the analyses indicate that site placement withing the network is appropriate, at least to the extent that sites appear not to be capturing identical information. Although the analysis suggests that the site placement was not mathematically optimal with regard to minimizing interpolation estimation variances for regions within the network, the current configuration appears to provide reasonable coverage of spatial areas of interest. Thus, the network designers' efforts to maximize the representative capacity of the network resulted in relatively uniform spatial coverage that is conducive to interpolation methods. A strictly mathematical analysis also indicated that in general, the network's designers chose sites that were regionally representative, and free of the influence of local emissions sources. However, a few sites appear to be influenced by local sources, and alternative siting may be desirable.

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Figure 1

LOCATION OF THE SITES FROM THE

NATIONAL TRENDS NETWORK

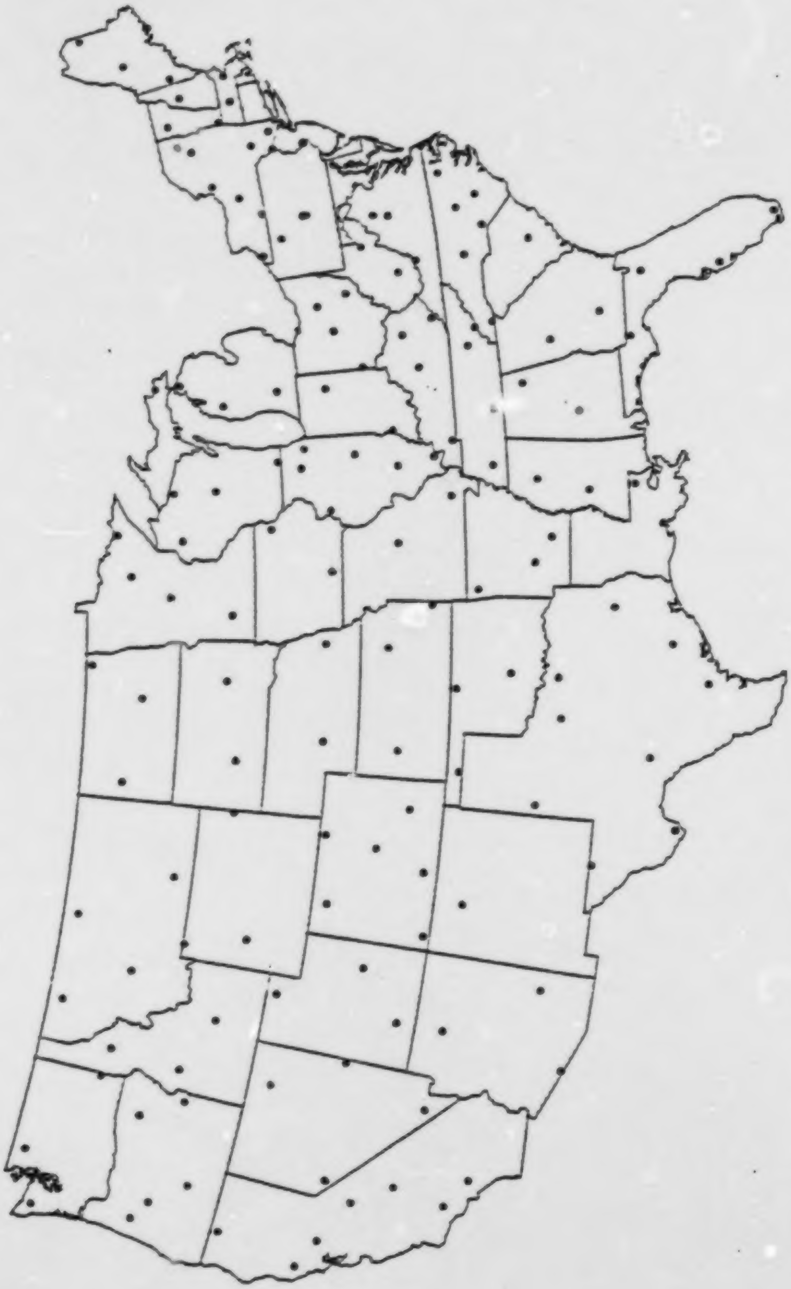

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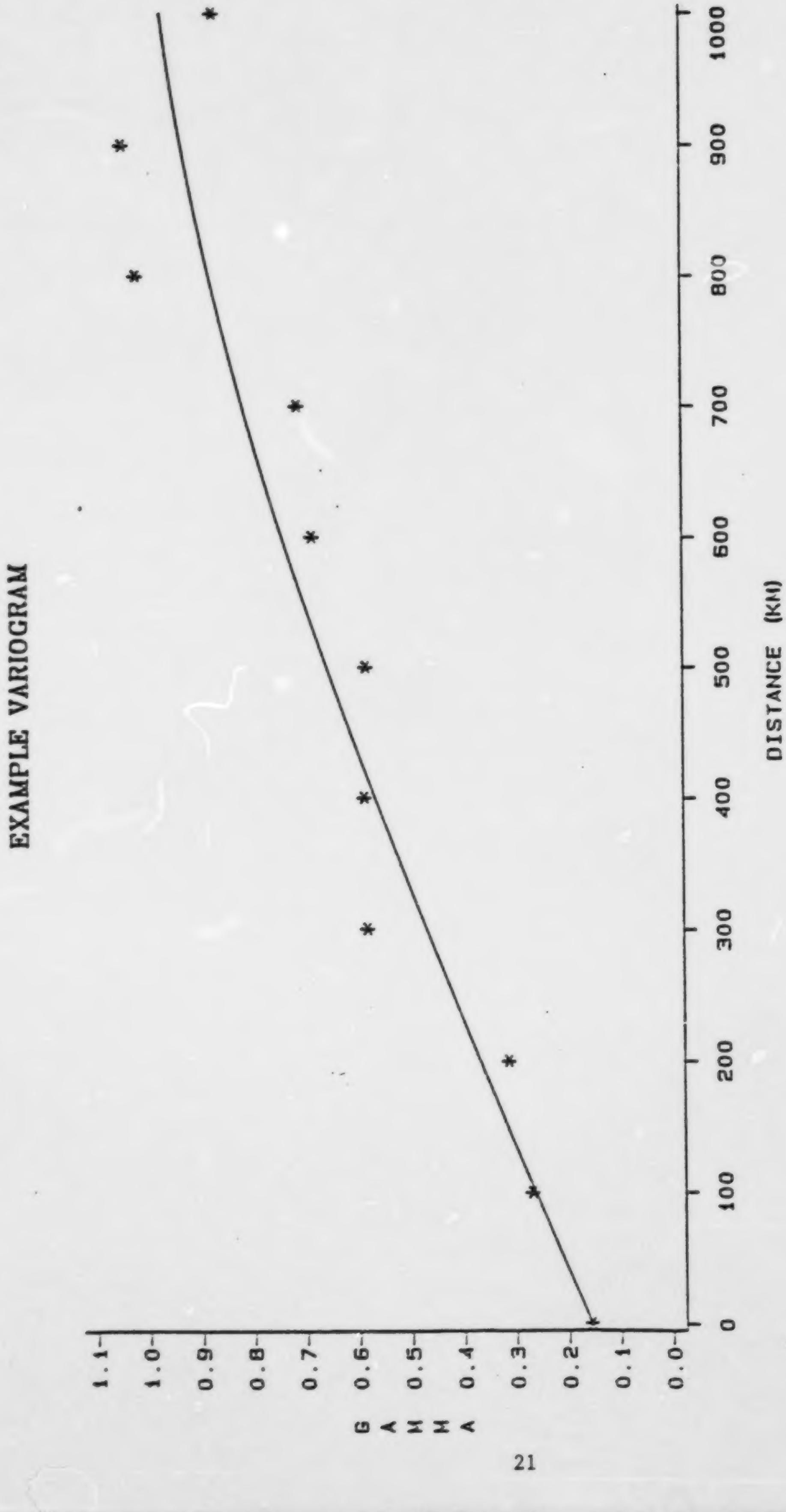
Figure 2


EXAMPLE VARIOGRAM
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1.0
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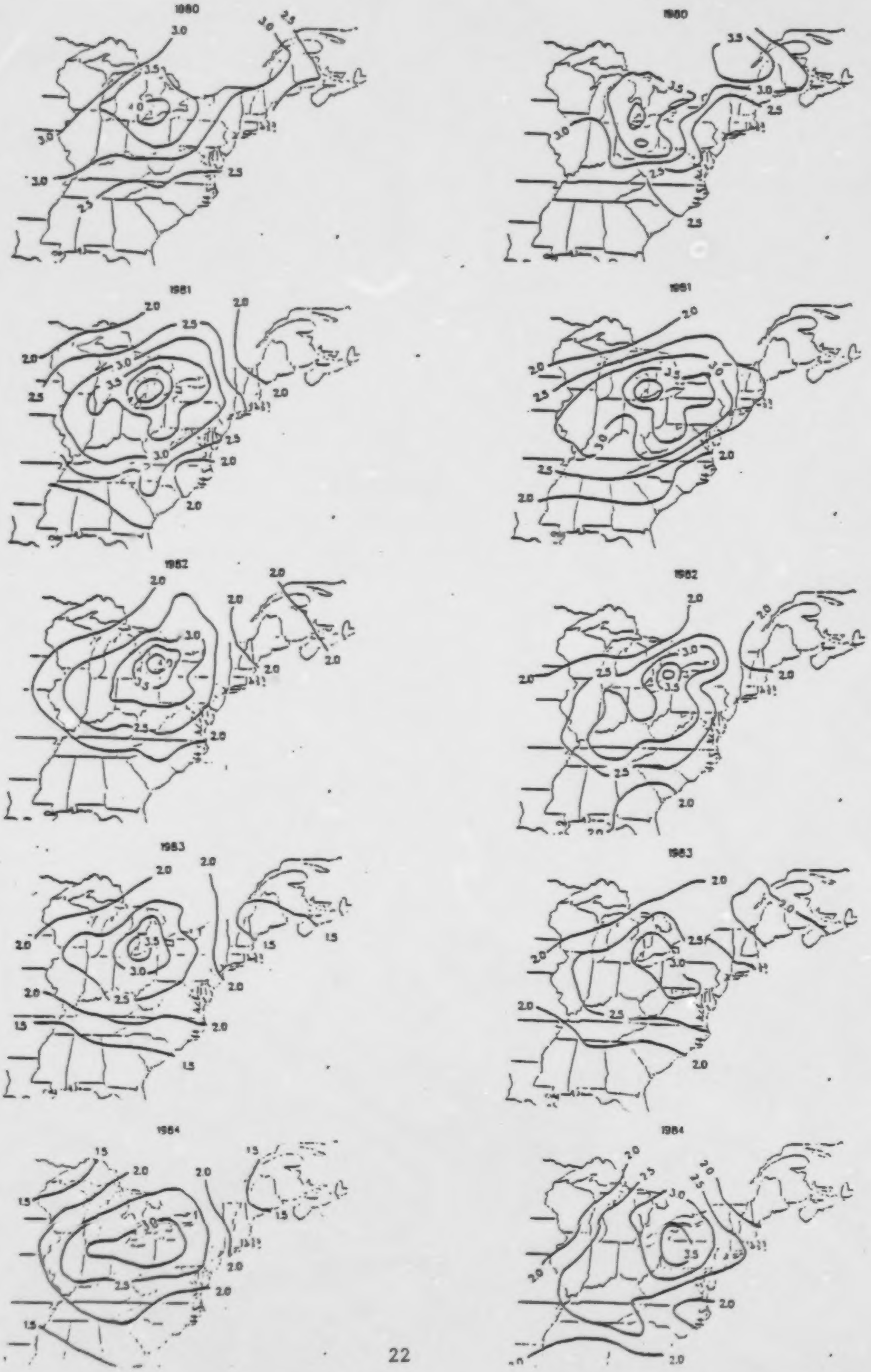
0.5
0.4
0.3
0.2
0.1
0.0
0
100
200
300
400
500
600
700
800
900
1000
DISTANCE (KM)

SULFATE

Figure 3

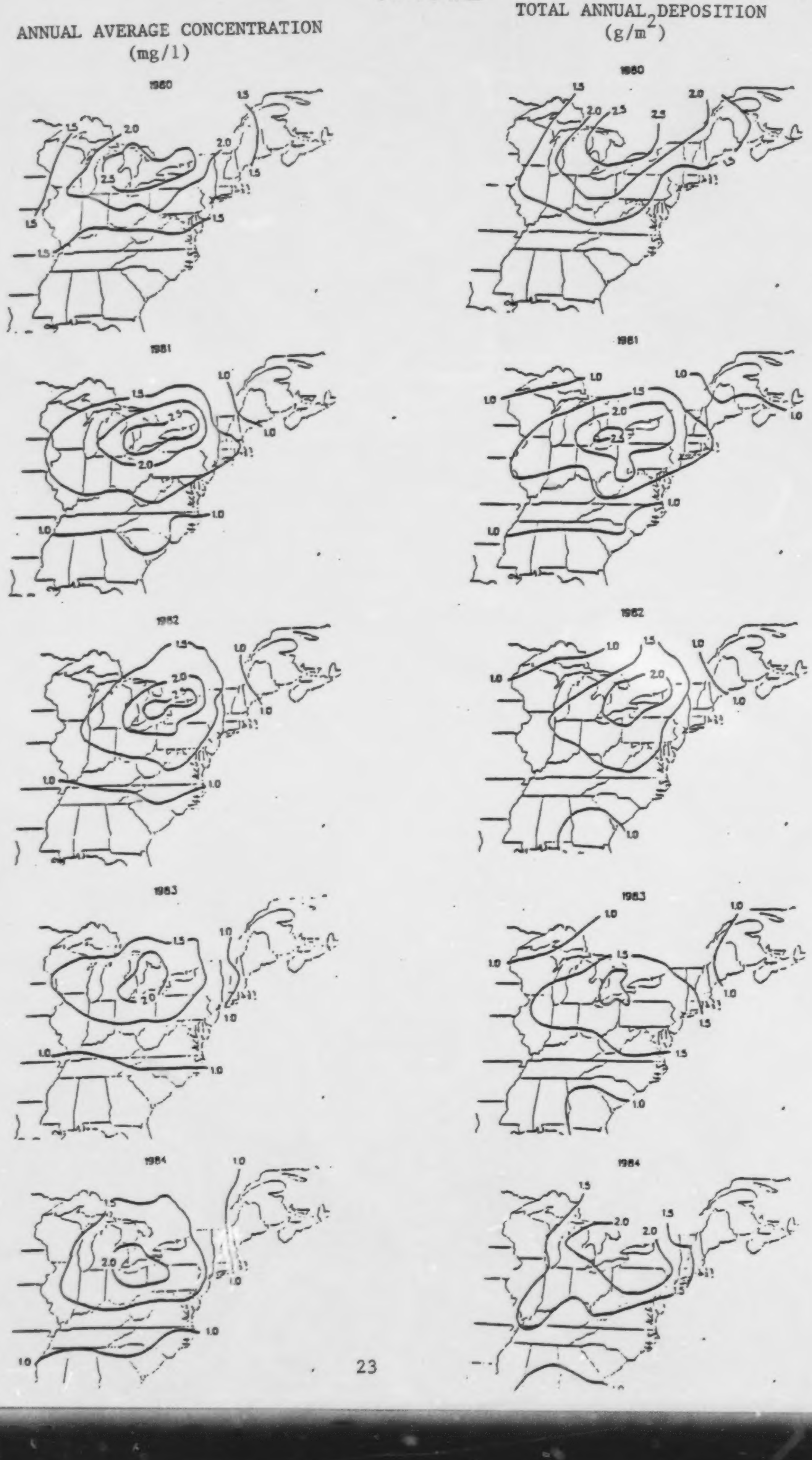


ANNUAL AVERAGE CONCENTRATION (mg/l)

TOTAL ANNUAL DEPOSITION (g/m^2)

NITRATE

Figure 4



ANNUAL AVERAGE CONCENTRATION (mg/l)

TOTAL ANNUAL DEPOSITION (g/m^2)

HYDROGEN ION

Figure 5

ANNUAL AVERAGE CONCENTRATION
(mg/1)

TOTAL ANNUAL DEPOSITION
(g/m^2)

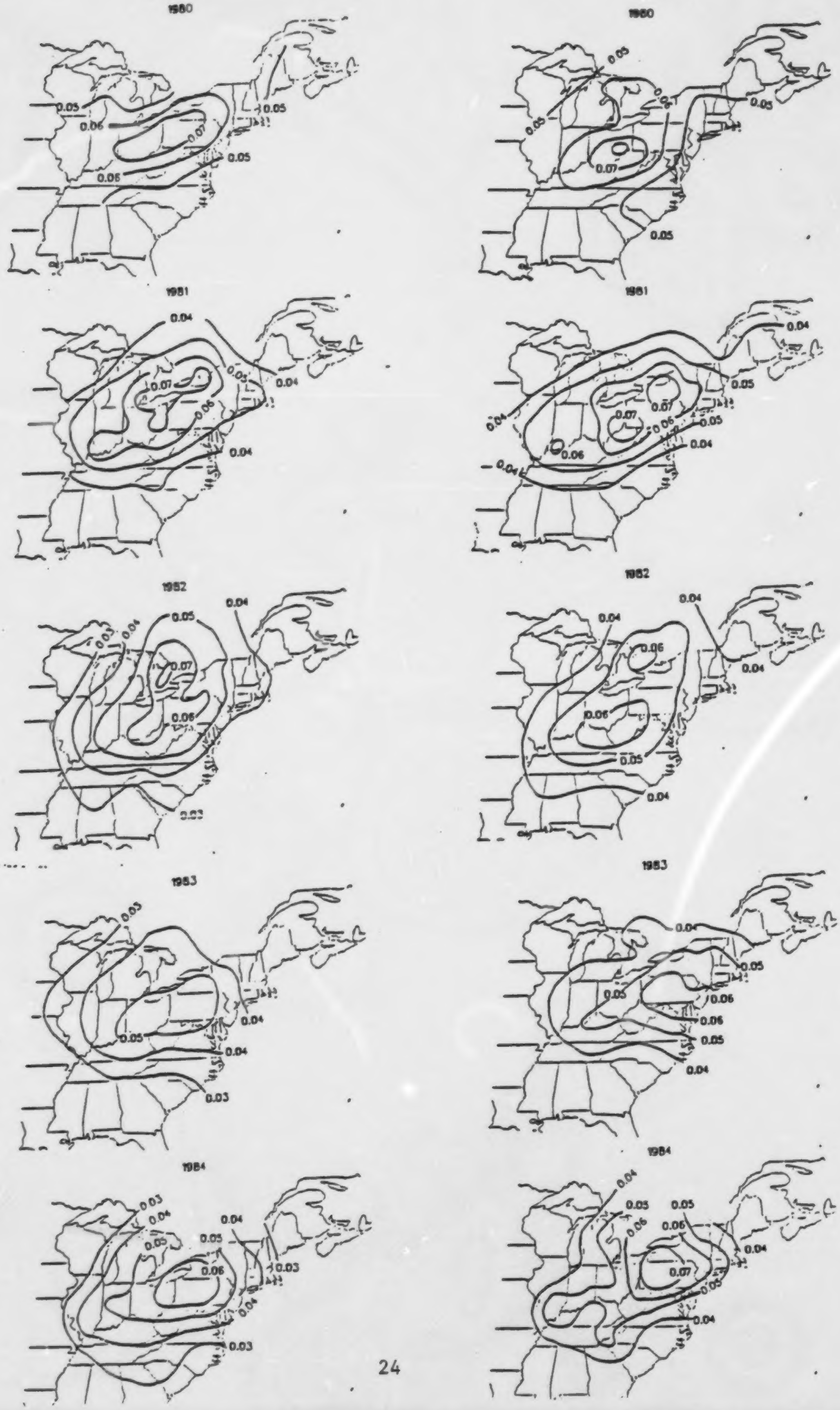
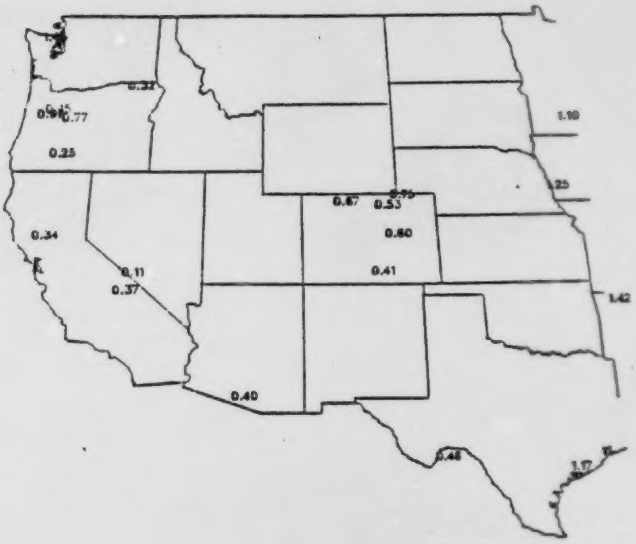


Figure 6

ANNUAL SULFATE DEPOSITION 1981 (g/m^2)



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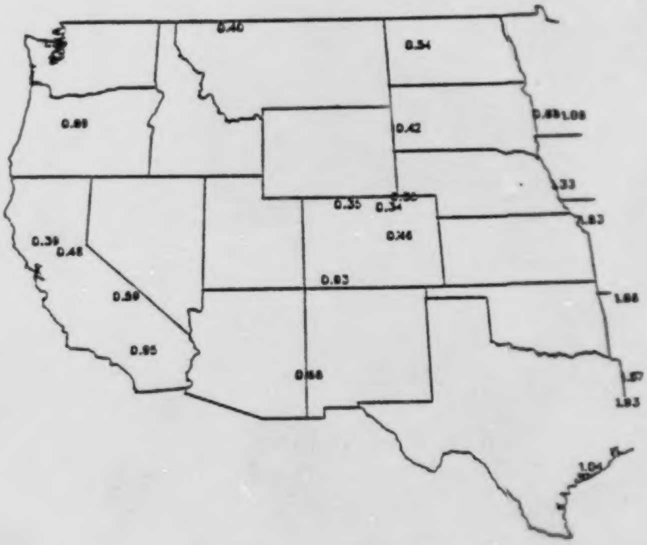
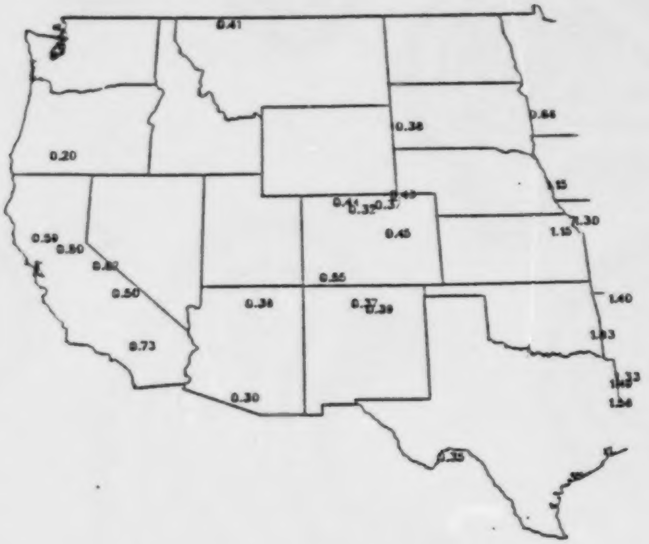
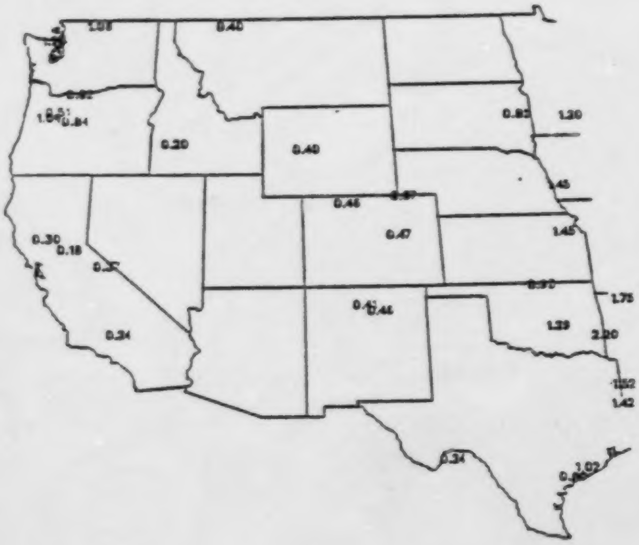


Figure 7



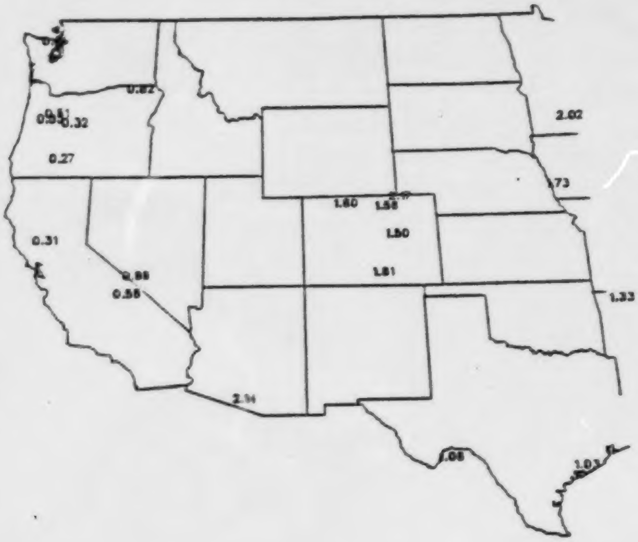
ANNUAL SULFATE DEPOSITION 1983 (g/m^2)



ANNUAL SULFATE DEPOSITION 1984 (g/m^2)

Figure 8

ANNUAL SULFATE CONCENTRATION 1981 (mg/1)



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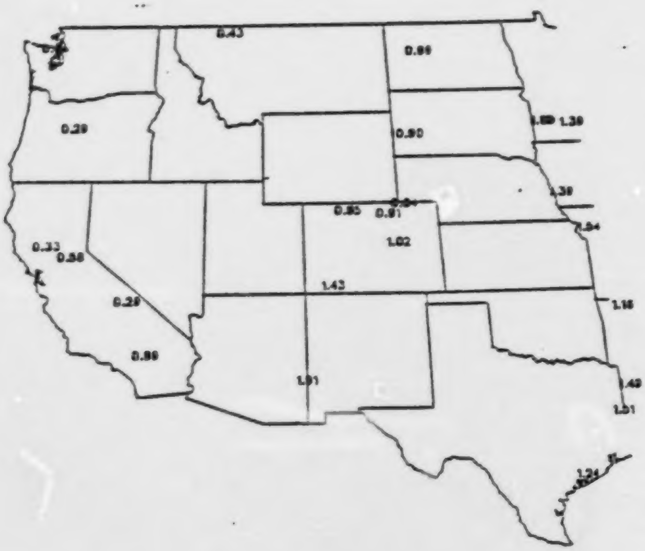
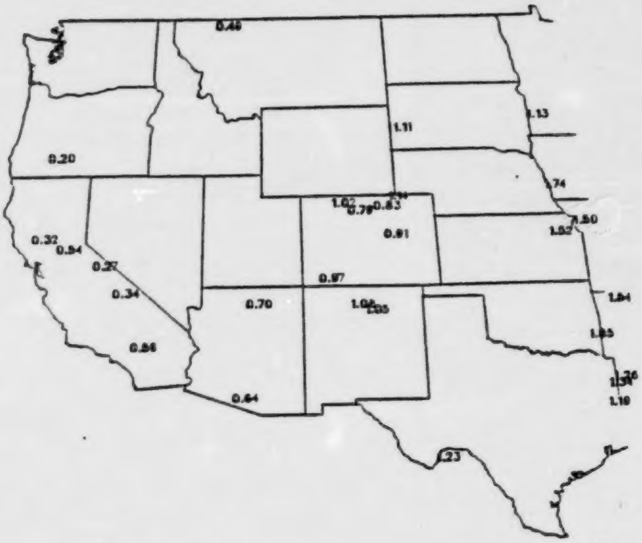


Figure 9

ANNUAL SULFATE CONCENTRATION 1983 (mg/1)



ANNUAL SULFATE CONCENTRATION 1984 (mg/1)

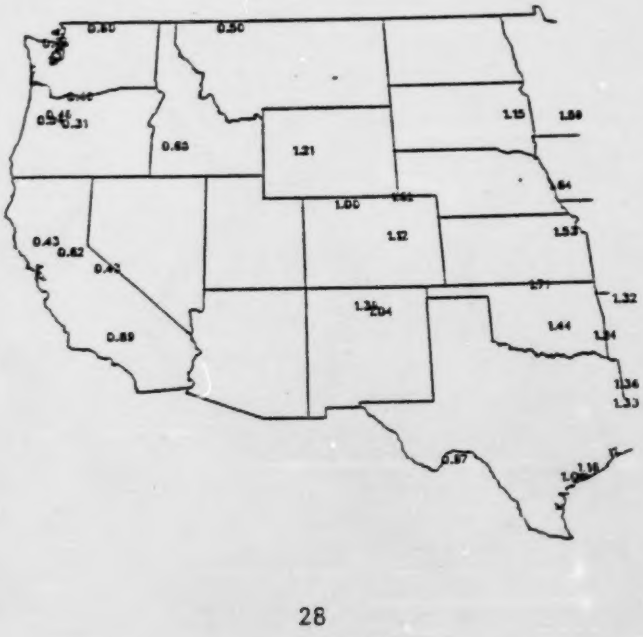
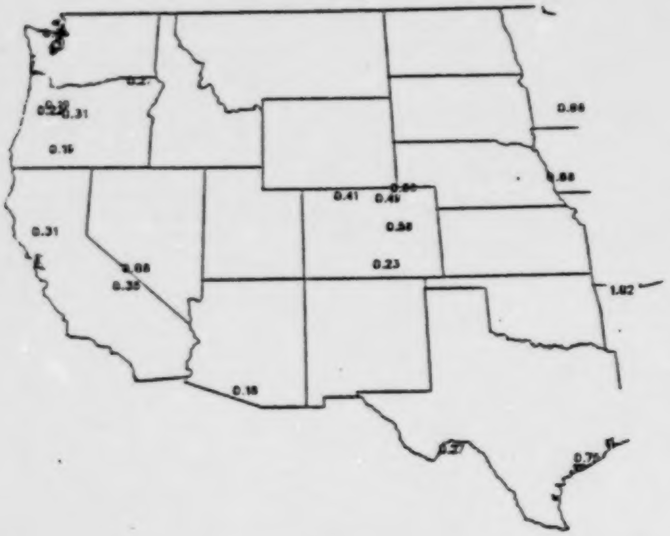


Figure 10

ANNUAL NITRATE DEPOSITION 1981 (g/m^2)



ANNUAL NITRATE DEPOSITION 1982 (g/m^2)

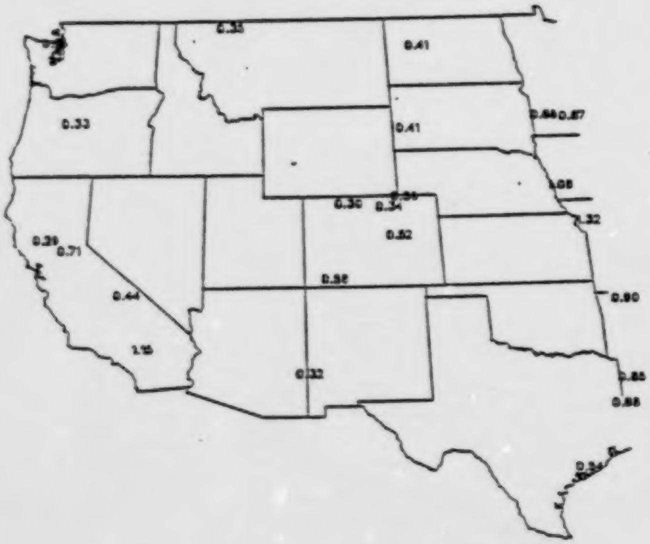
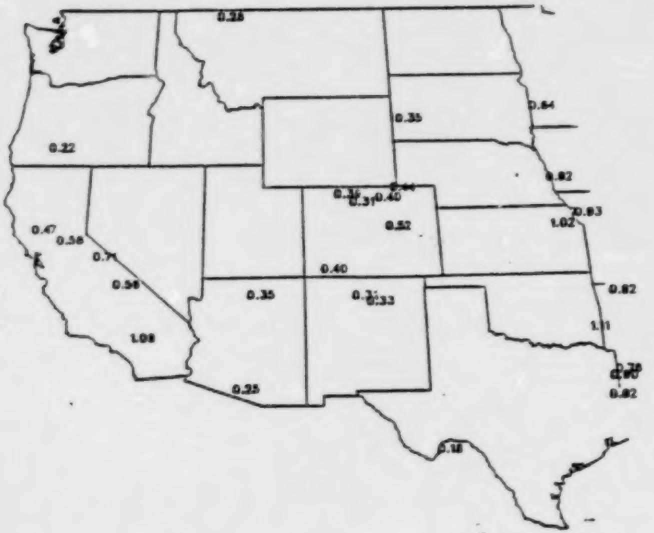
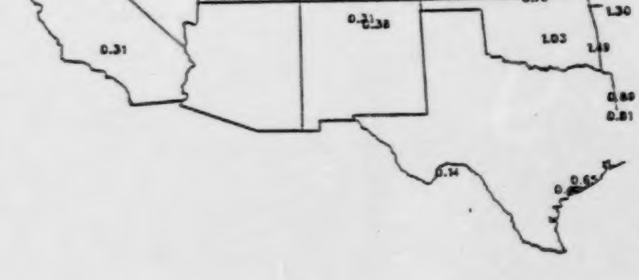


Figure 11

ANNUAL NITRATE DEPOSITION 1983 (g/m^2)

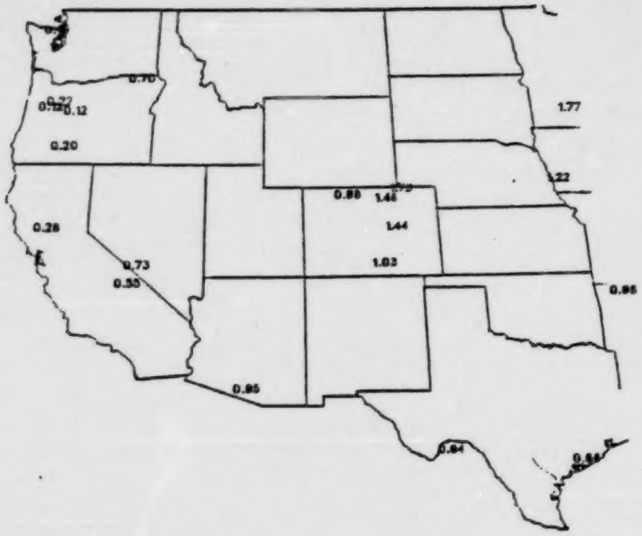


ANNUAL NITRATE DEPOSITION 1984 (g/m^2)

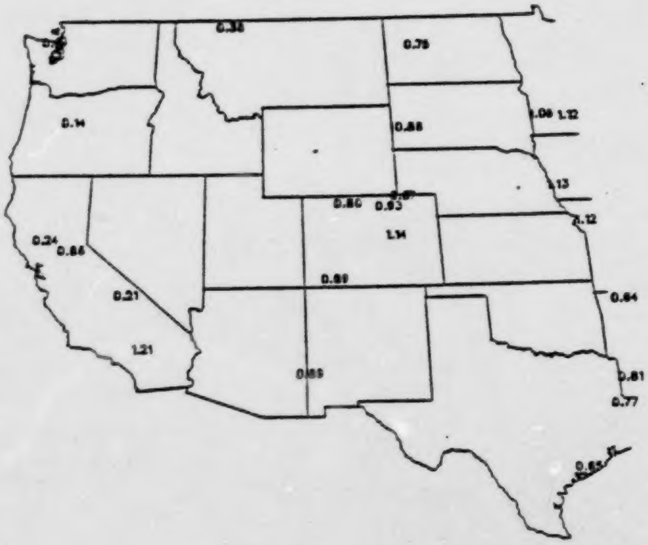


ANNUAL NITRATE CONCENTRATION 1981 (mg/l)

Figure 12



ANNUAL NITRATE CONCENTRATION 1982 (mg/l)



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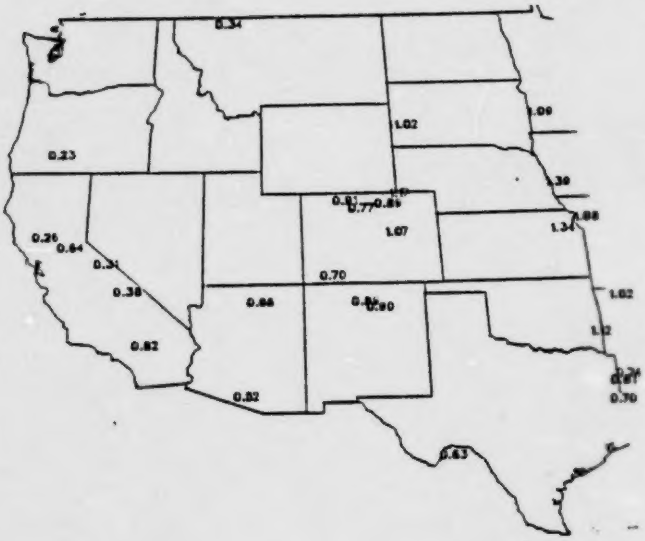


ANNUAL NITRATE CONCENTRATION 1984 (mg/l)

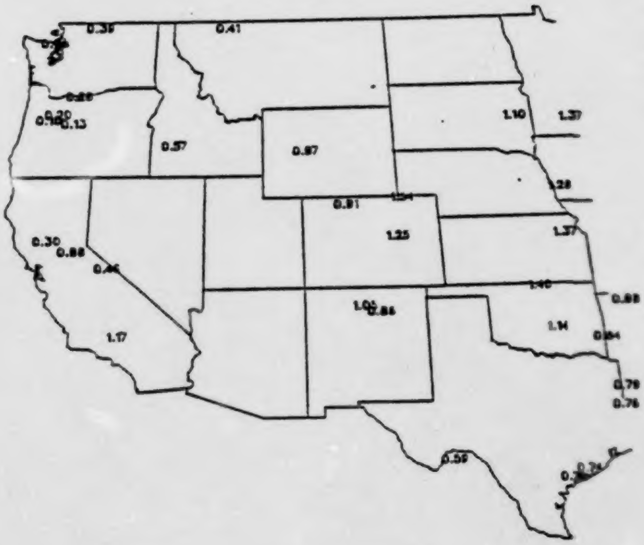
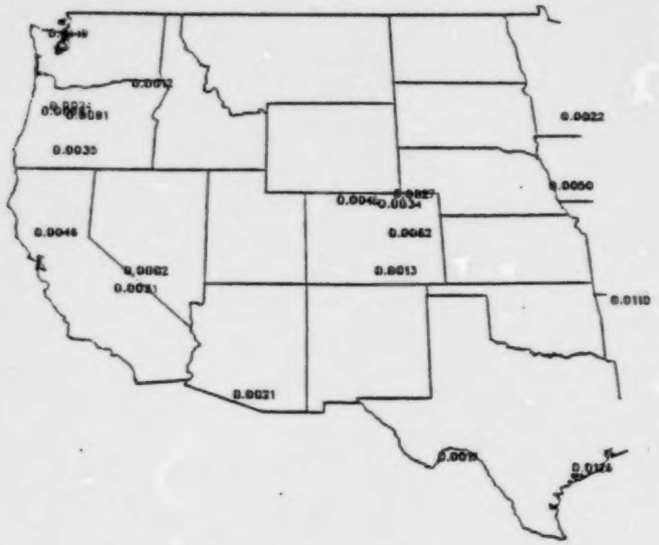


Figure 14

ANNUAL HYDROGEN ION DEPOSITION 1981 (g/m^2)



ANNUAL HYDROGEN ION DEPOSITION 1982 (g/m^2)

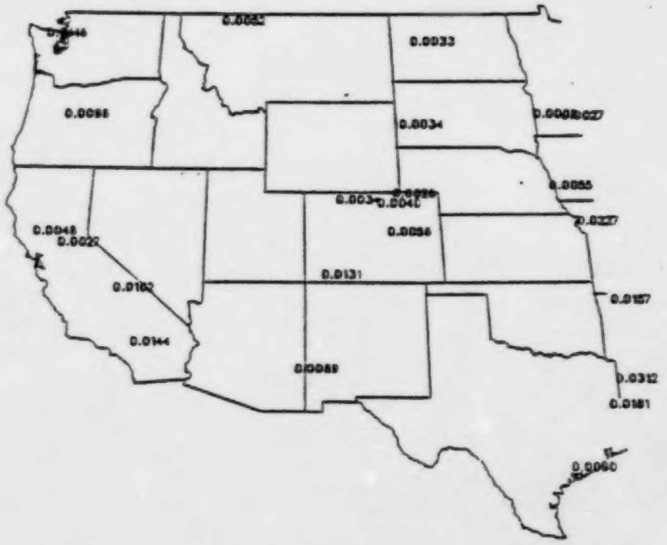
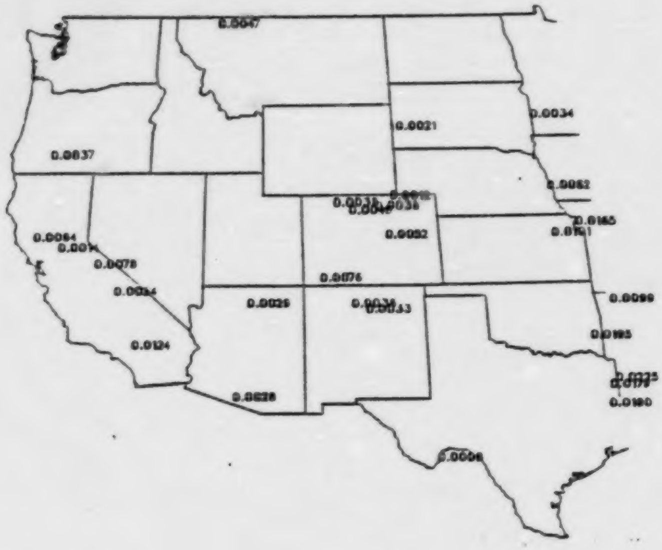


Figure 15

ANNUAL HYDROGEN ION DEPOSITION 1983 (g/m^2)



ANNUAL HYDROGEN ION DEPOSITION 1984 (g/m^2)

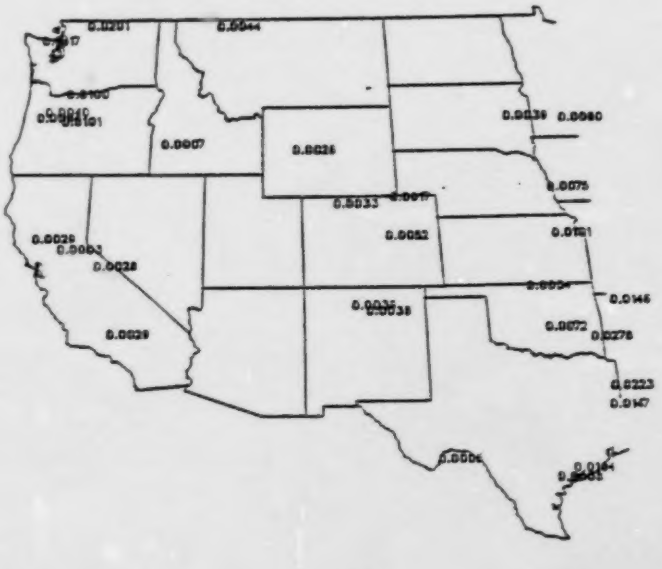
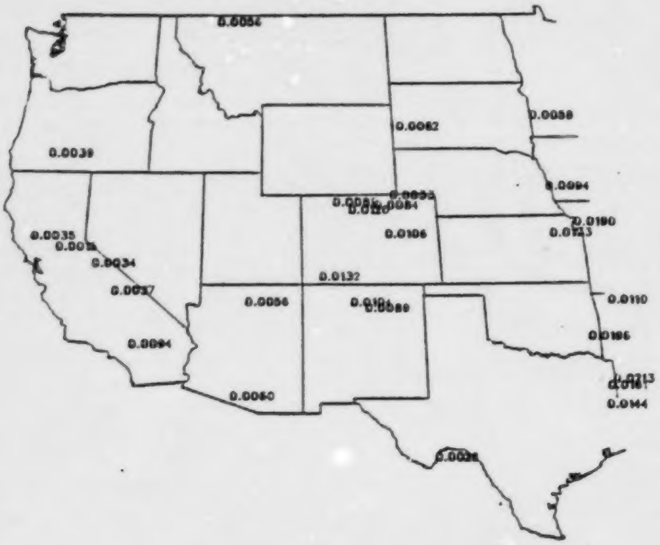


Figure 16

ANNUAL HYDROGEN ION CONCENTRATION 1983 (mg/l)



ANNUAL HYDROGEN ION CONCENTRATION 1984 (mg/l)

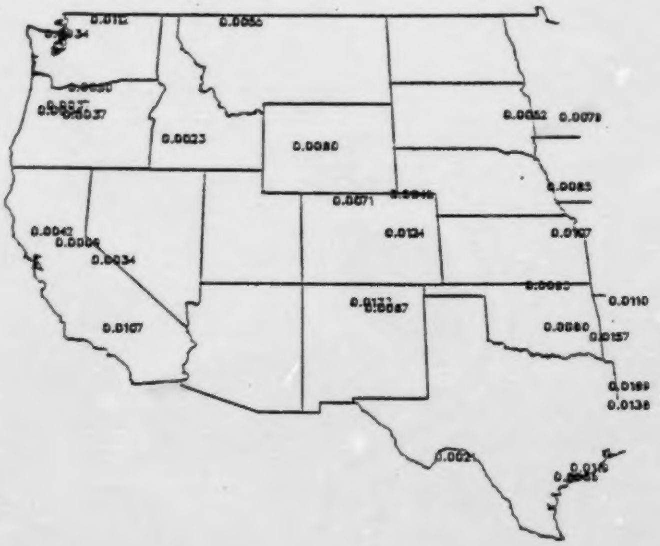
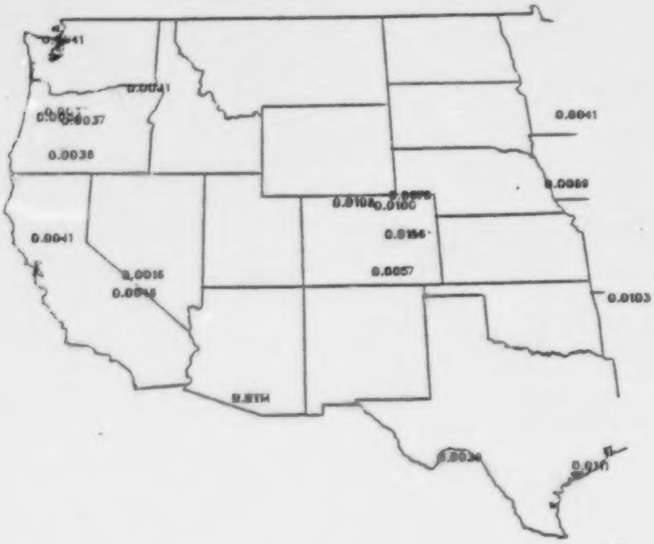


Figure 17

ANNUAL HYDROGEN ION CONCENTRATION 1981 (mg/l)



ANNUAL HYDROGEN ION CONCENTRATION 1982 (mg/l)

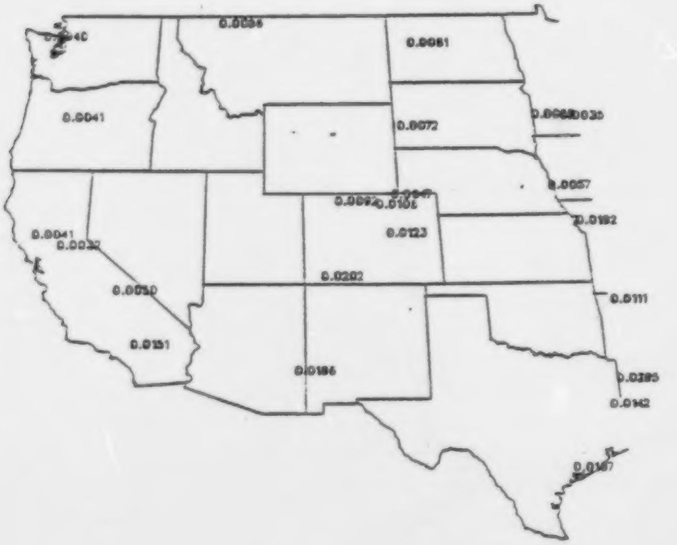
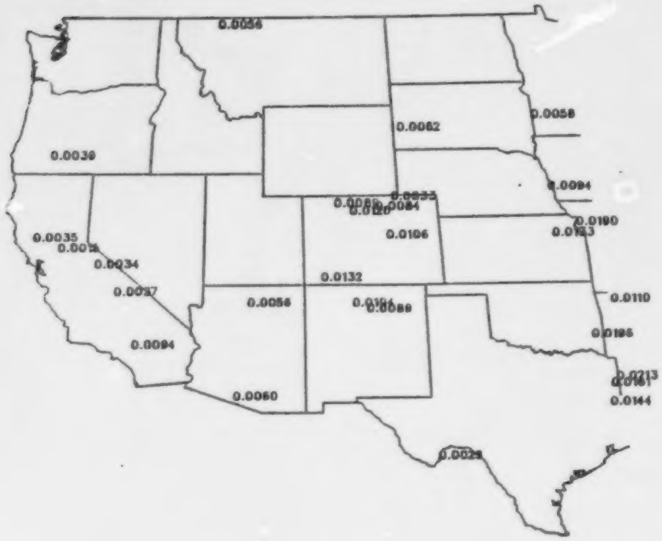


Figure 18

ANNUAL HYDROGEN ION CONCENTRATION 1983 (mg/l)



ANNUAL HYDROGEN ION CONCENTRATION 1984 (mg/l)

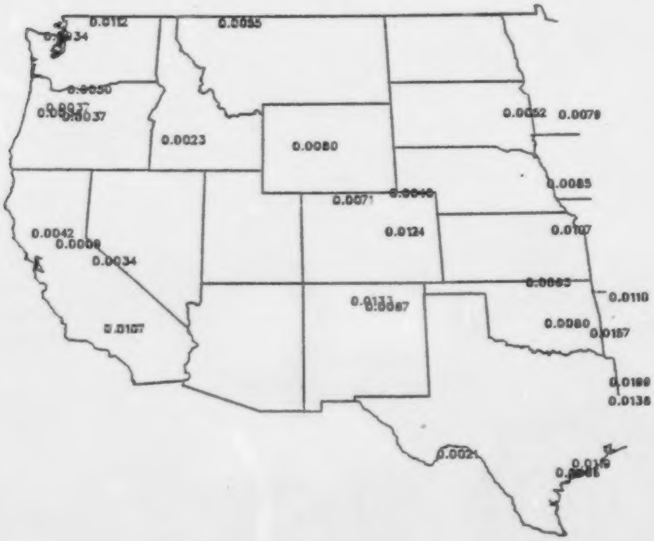
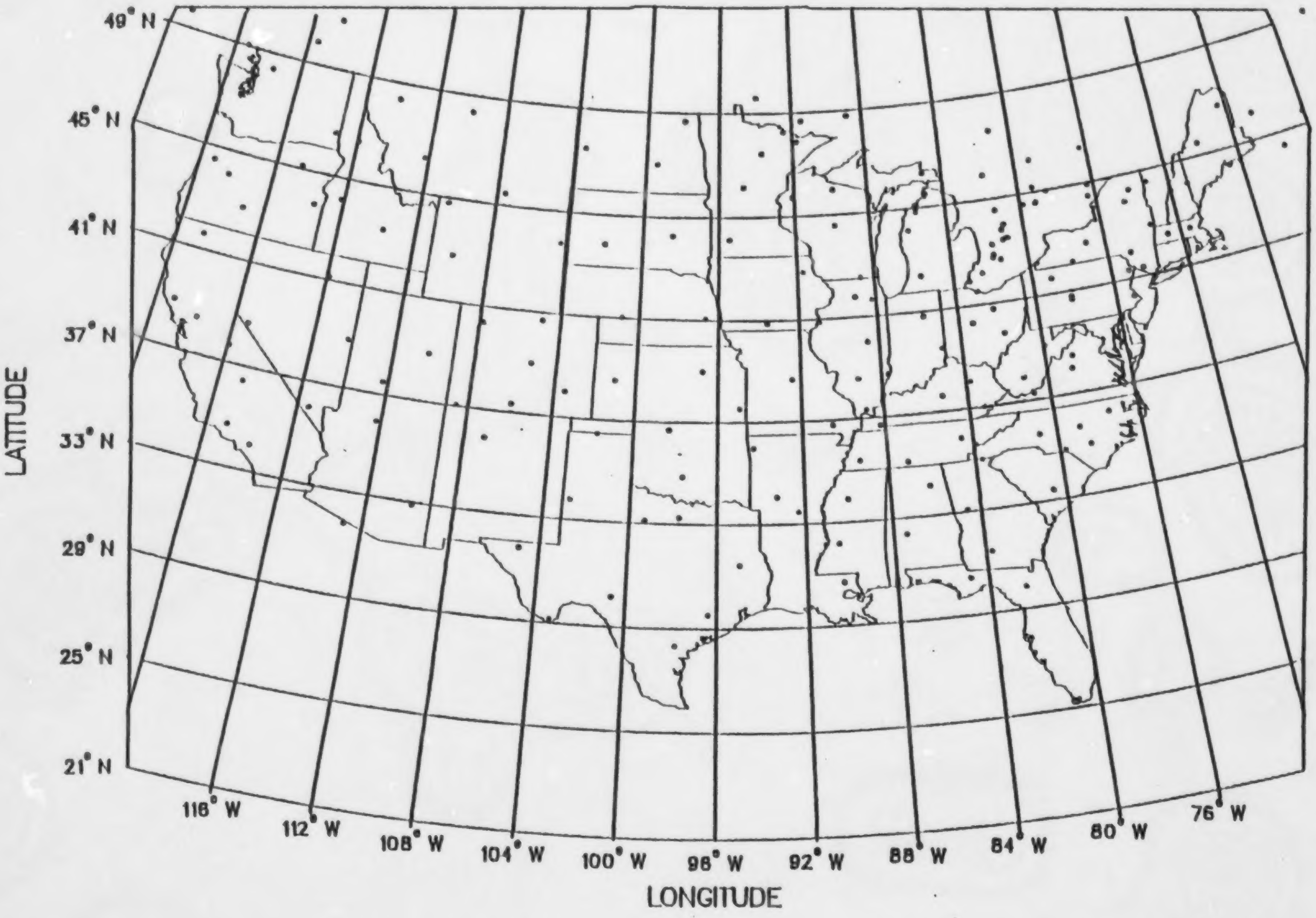


Figure 19

LOCATION OF THE SITES FROM THE
NATIONAL TRENDS NETWORK AND FROM CANADA



LOCATION OF THE SITES FROM THE

NATIONAL TRENDS NETWORK

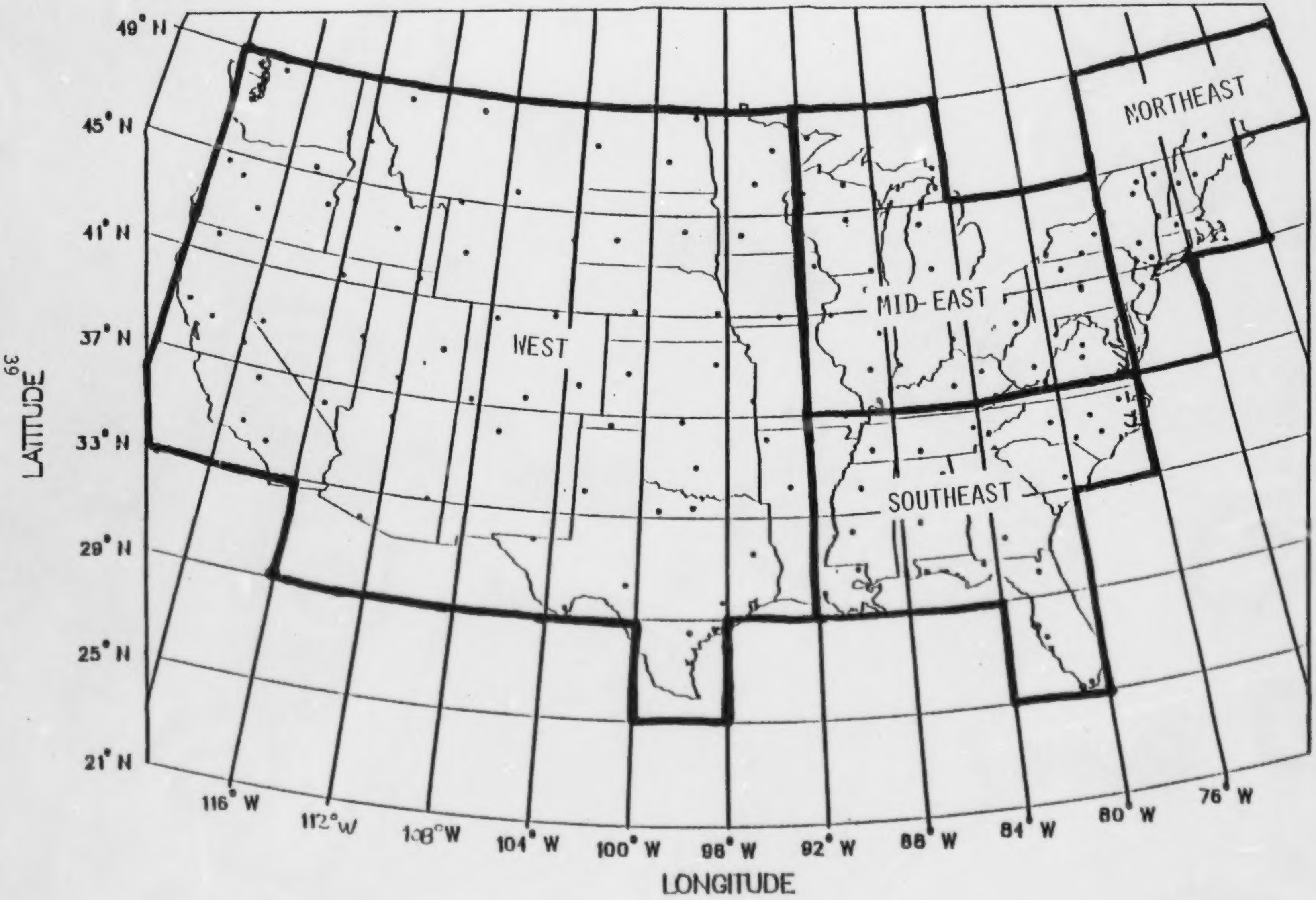
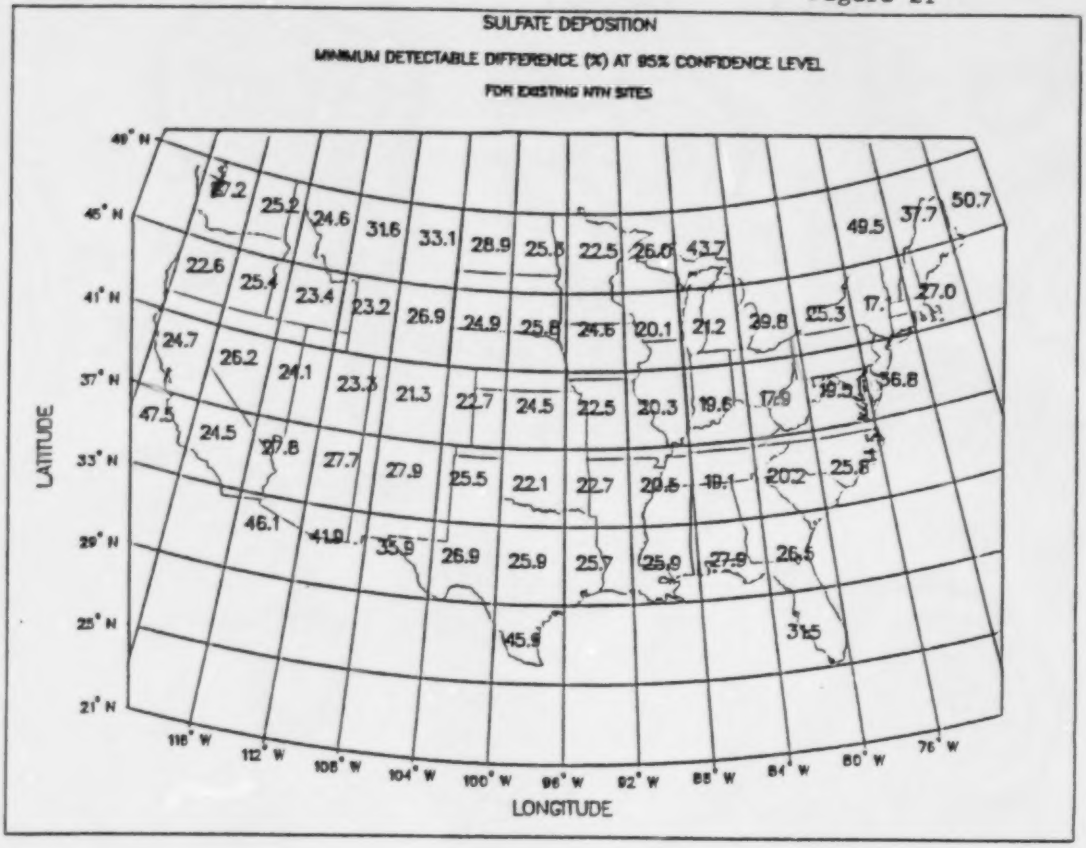


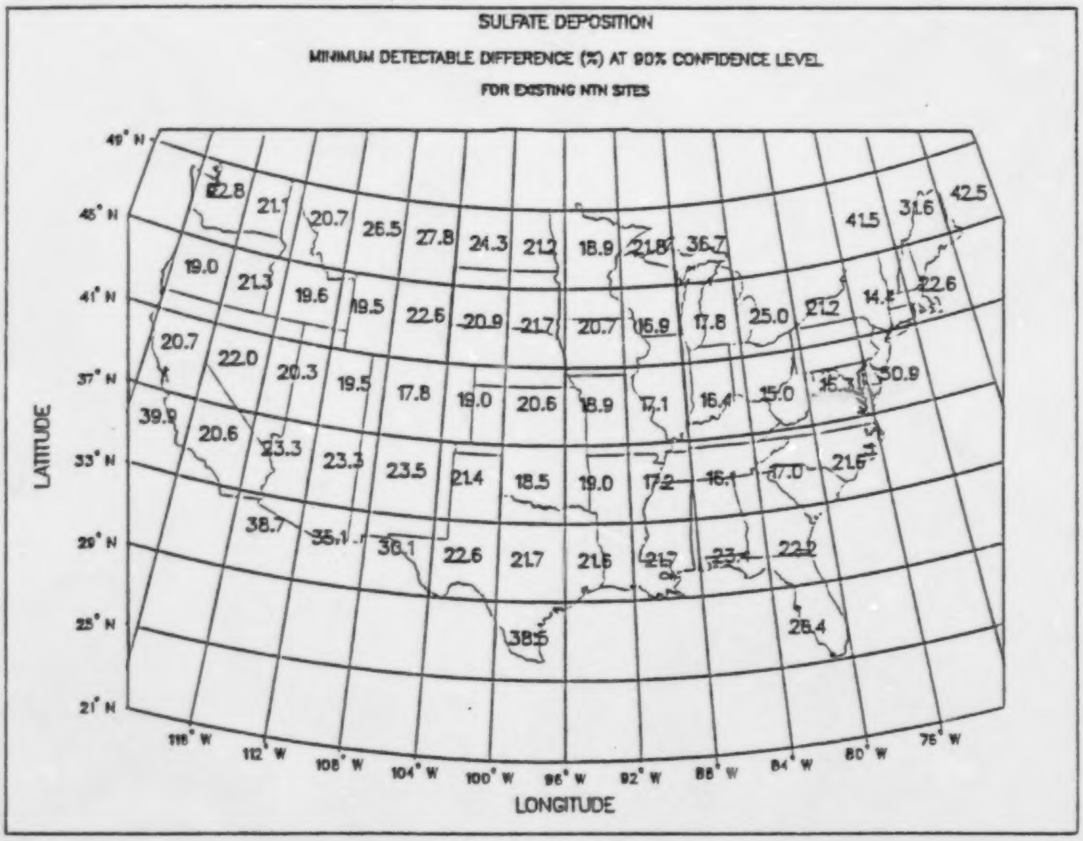
Figure 21



SULFATE DEPOSITION

MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

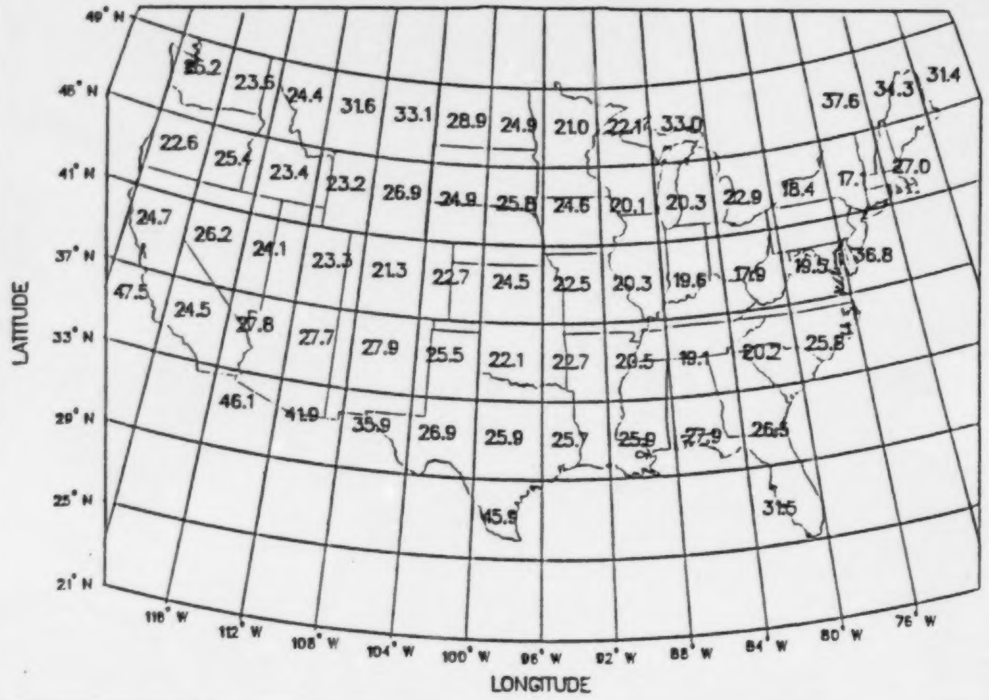
FOR EXISTING NTN SITES



SULFATE DEPOSITION

MINIMUM DETECTABLE DIFFERENCE (%) AT 90% CONFIDENCE LEVEL

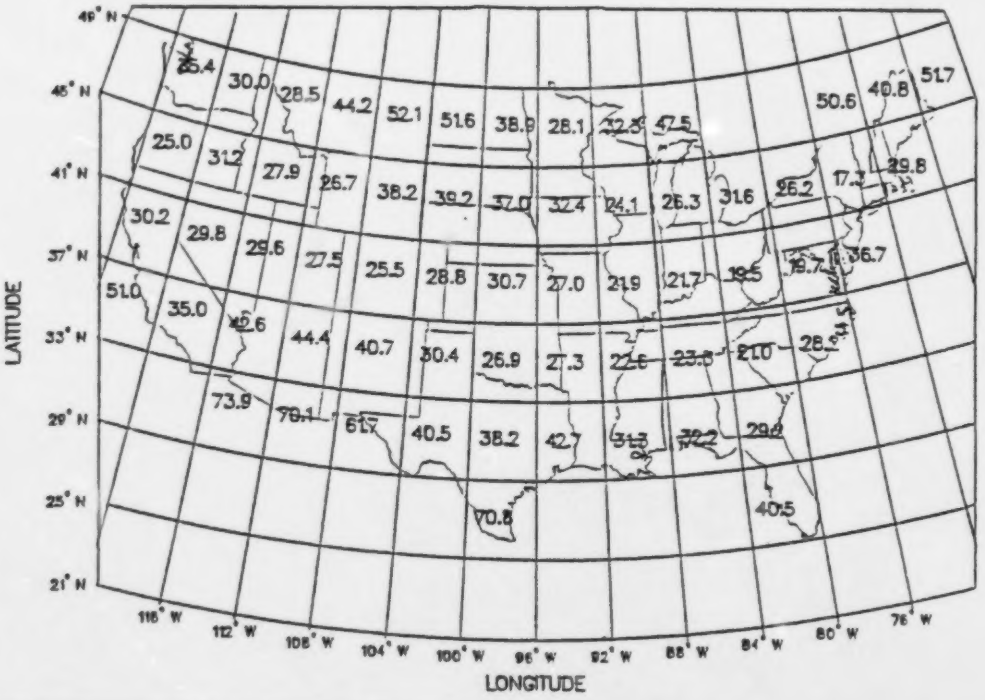
FOR EXISTING NTN SITES



SULFATE DEPOSITION

MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

USING EXISTING NTN SITES AND CANADIAN SITES

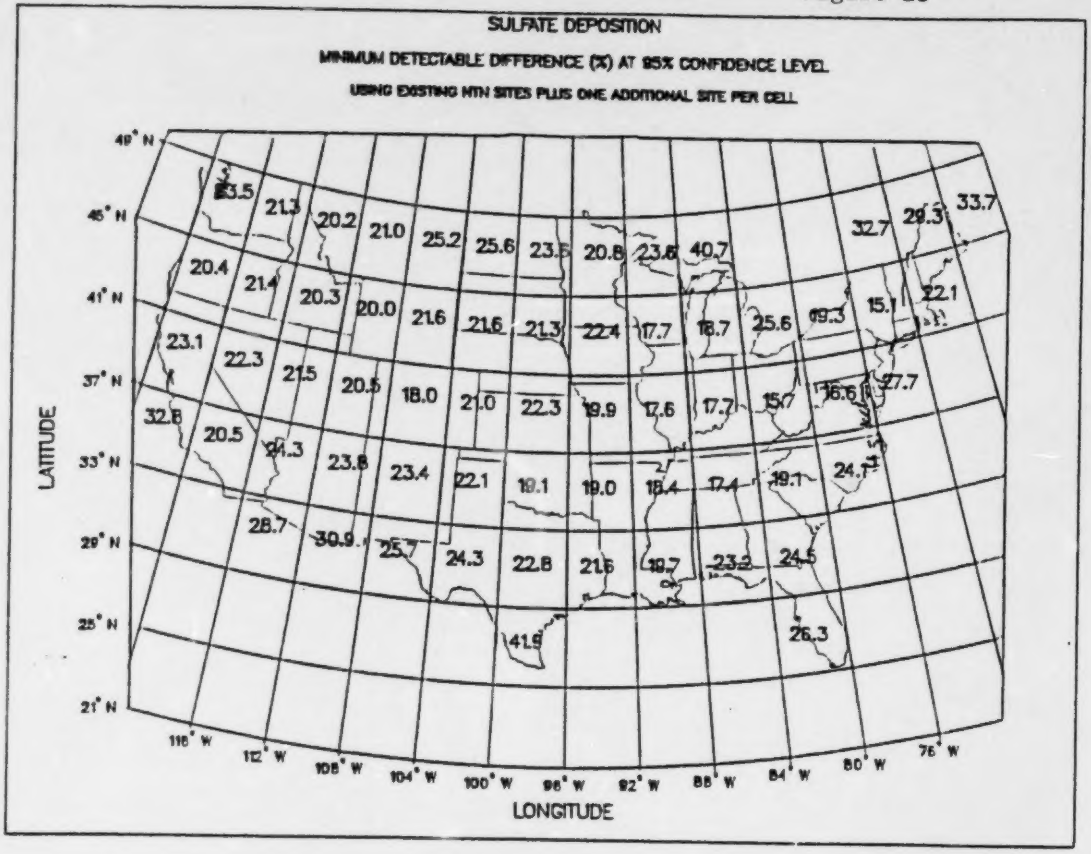


SULFATE DEPOSITION

MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

DELETING ONE NTN SITE PER CELL

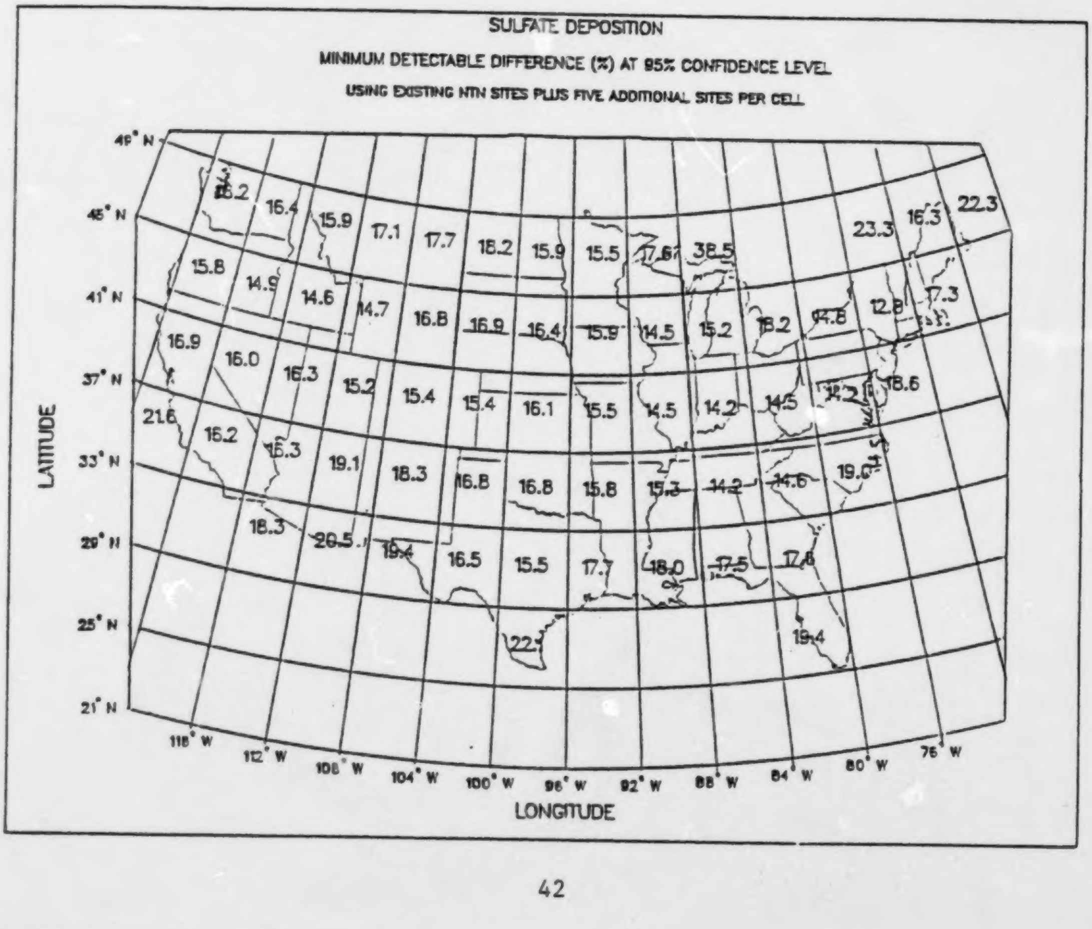
Figure 23



SULFATE DEPOSITION

MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

USING EXISTING NTN SITES PLUS ONE ADDITIONAL SITE PER CELL

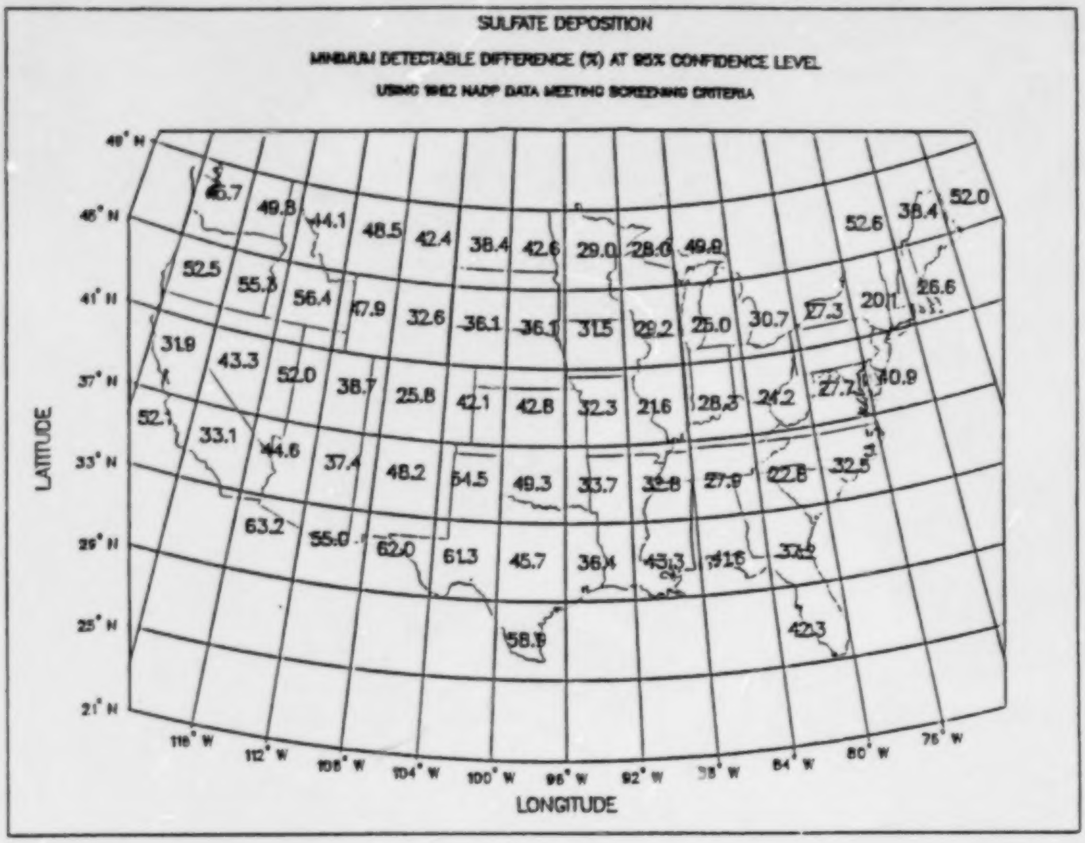


SULFATE DEPOSITION

MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

USING EXISTING NTN SITES PLUS FIVE ADDITIONAL SITES PER CELL

Figure 24

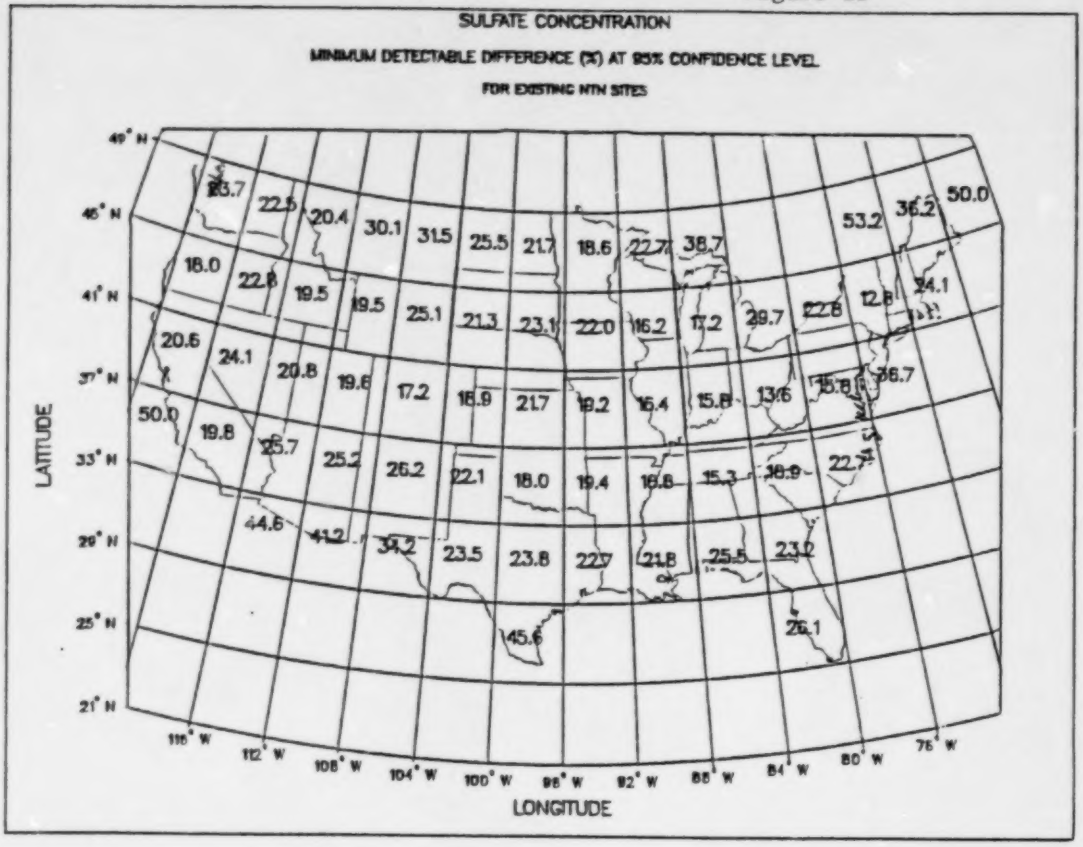


SULFATE DEPOSITION

MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

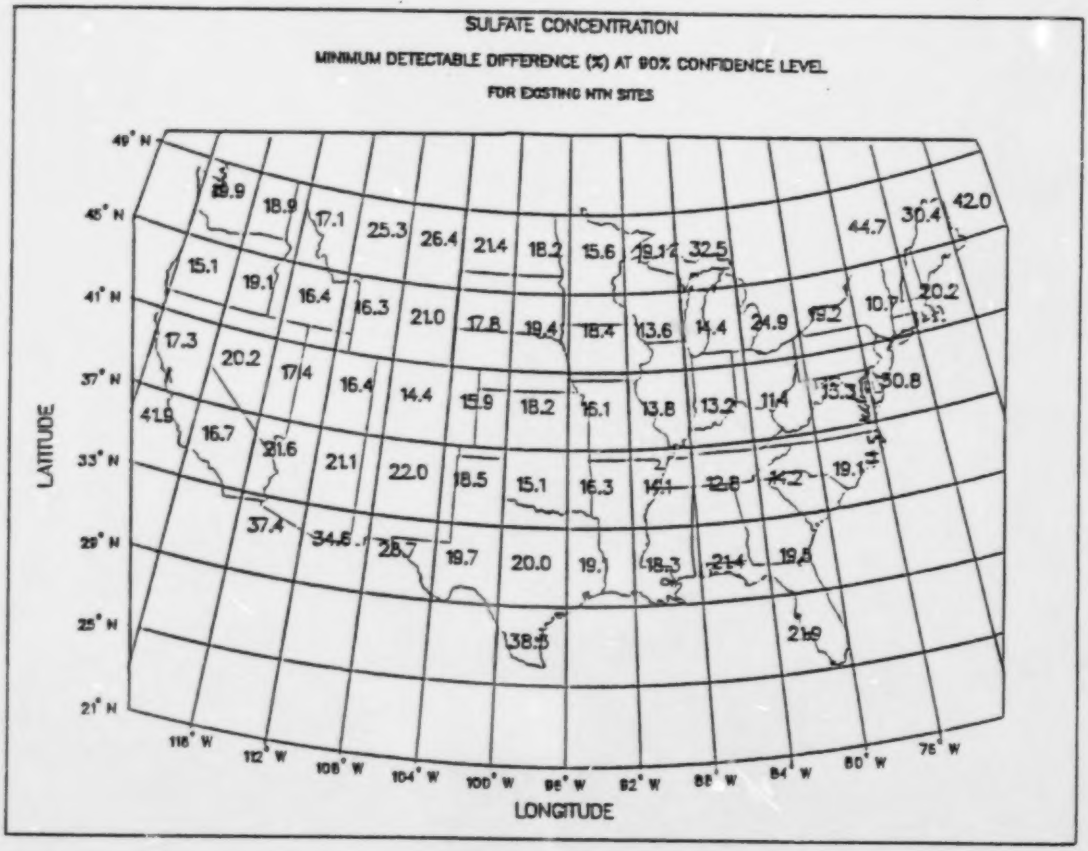
USING 1982 NADP DATA MEETING SCREENING CRITERIA

Figure 25


SULFATE CONCENTRATION

MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

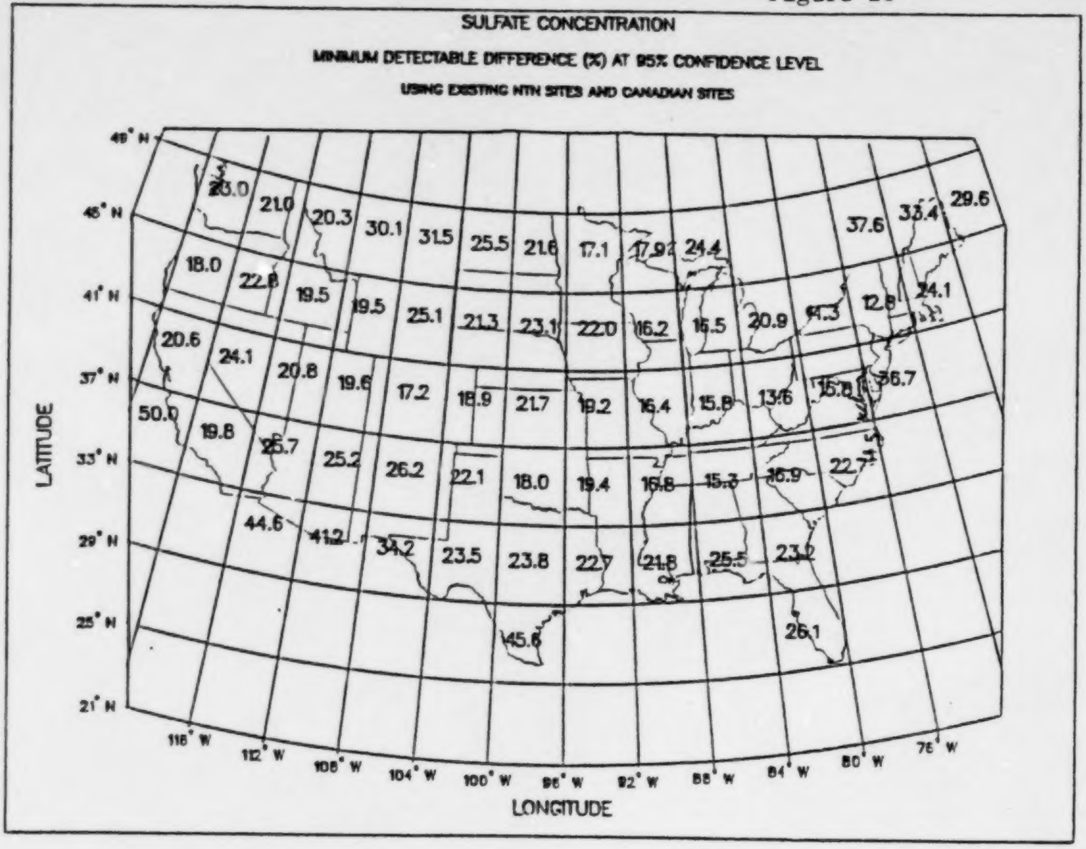
FOR EXISTING NTN SITES


SULFATE CONCENTRATION

MINIMUM DETECTABLE DIFFERENCE (%) AT 90% CONFIDENCE LEVEL

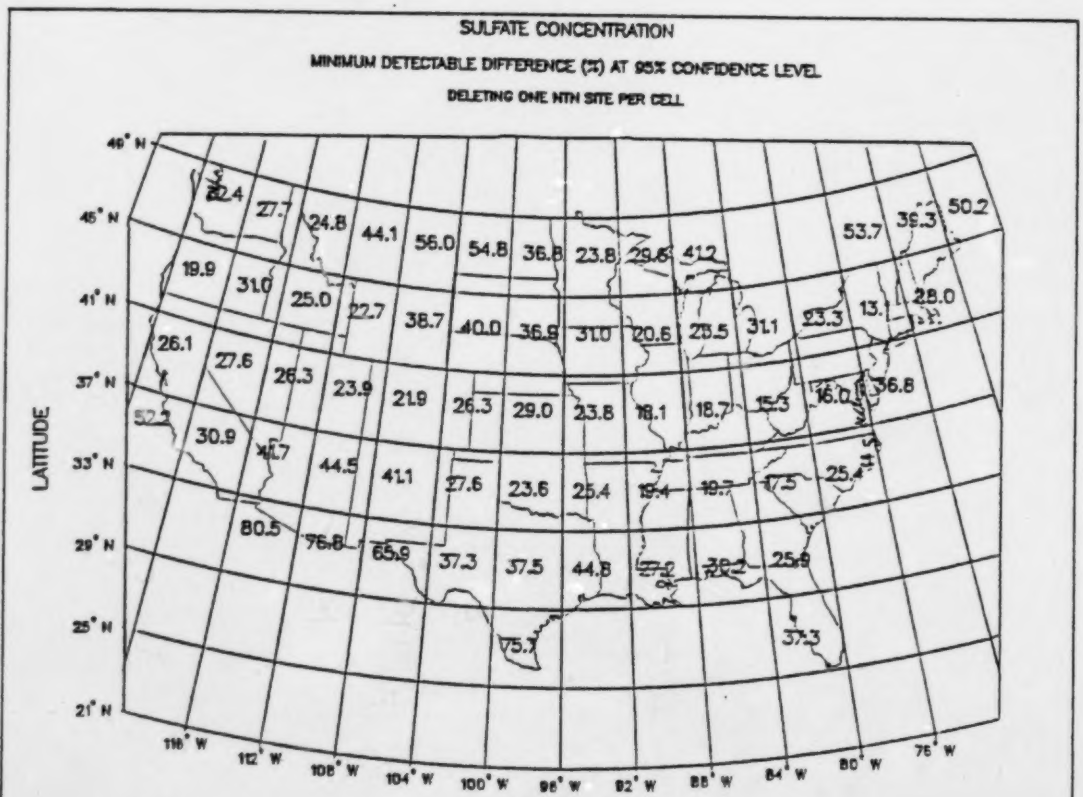
FOR EXISTING NTN SITES

Figure 26


SULFATE CONCENTRATION

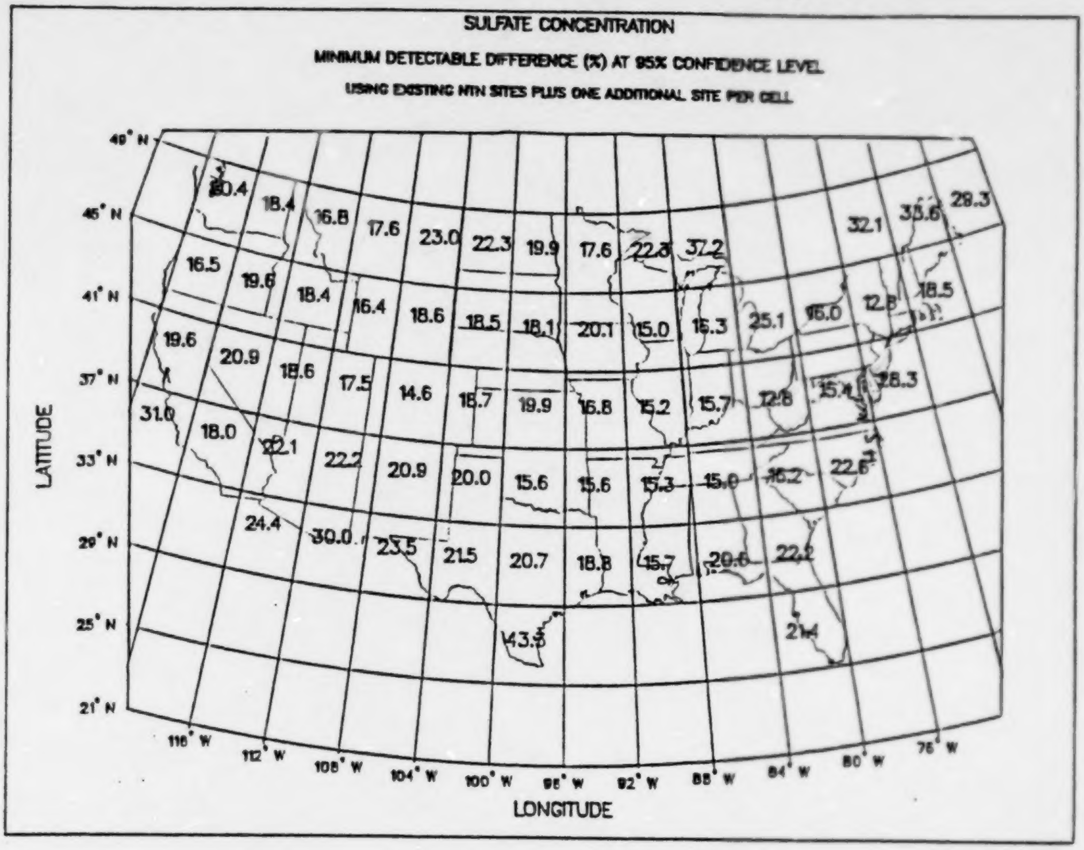
MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

USING EXISTING NTN SITES AND CANADIAN SITES


SULFATE CONCENTRATION

MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

DELETING ONE NTN SITE PER CELL


SULFATE CONCENTRATION
MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL
USING EXISTING NTN SITES PLUS ONE ADDITIONAL SITE PER CELL
49° N
45° N
41° N
37° N
33° N
29° N
25° N
21° N
LATITUDE
116° W
112° W
108° W
104° W
100° W
96° W
92° W
88° W
84° W
80° W
76° W
LONGITUDE
20.4
18.4
16.8
17.6
23.0
22.3
19.9
17.6
22.3
37.2
32.1
35.6
28.3
16.5
19.6
18.4
16.4
18.6
18.5
18.1
20.1
15.0
16.3
25.1
16.0
12.8
18.5
19.6
20.9
18.6
17.5
14.6
16.7
19.9
16.8
15.2
15.7
12.8
15.4
28.3
31.0
18.0
22.1
22.2
20.9
20.0
15.6
15.6
15.3
15.0
16.2
22.6
24.4
30.0
23.5
21.5
20.7
18.8
15.7
20.6
22.2
43.5
21.4

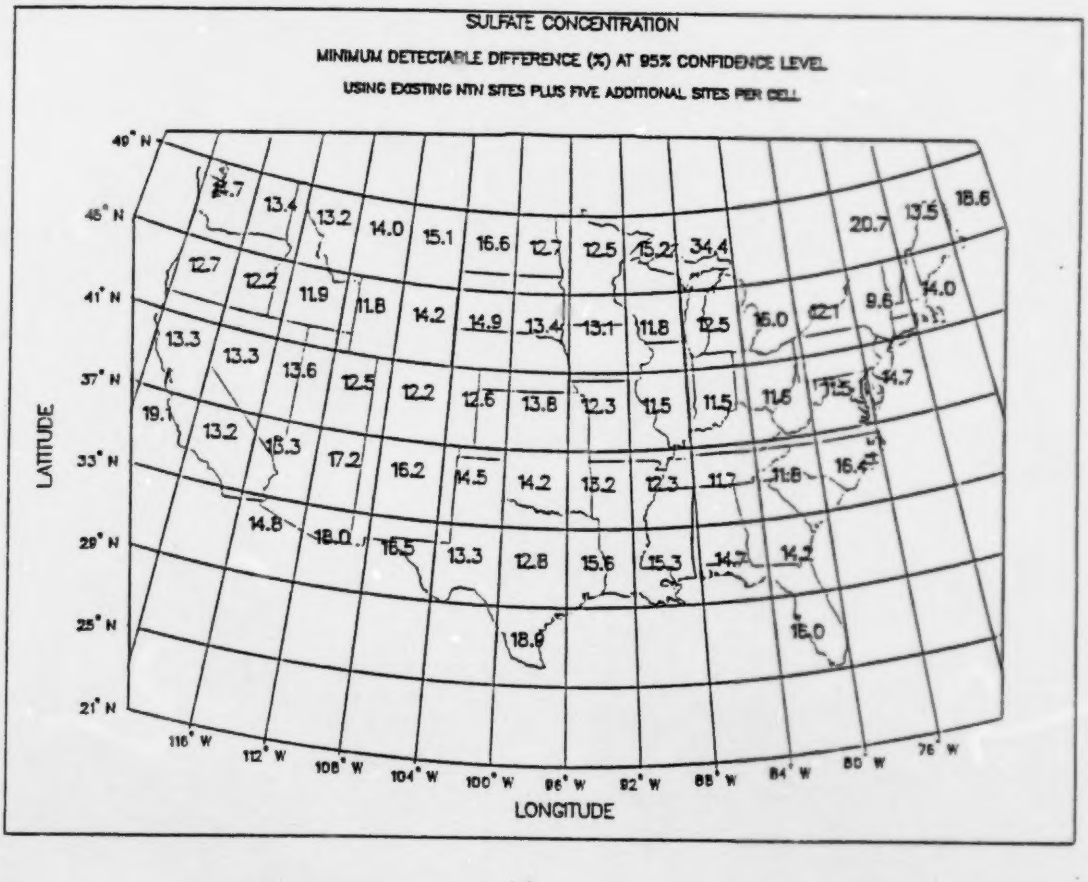

SULFATE CONCENTRATION
MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL
USING EXISTING NTN SITES PLUS FIVE ADDITIONAL SITES PER CELL
49° N
45° N
41° N
37° N
33° N
29° N
25° N
21° N
LATITUDE
116° W
112° W
108° W
104° W
100° W
96° W
92° W
88° W
84° W
80° W
76° W
LONGITUDE
13.4
13.2
14.0
15.1
16.6
12.7
12.5
15.2
34.4
20.7
13.5
18.6
12.7
12.2
11.9
11.8
14.2
14.9
13.4
13.1
11.8
12.5
16.0
12.1
9.6
14.0
13.3
13.3
13.6
12.5
12.2
12.6
13.8
12.3
11.5
11.5
11.6
11.5
14.7
19.1
13.2
13.3
17.2
16.2
14.5
14.2
13.2
12.3
11.7
11.8
16.4
14.8
18.0
16.5
13.3
12.8
15.6
15.3
14.7
14.2
18.9
16.0

Figure 28

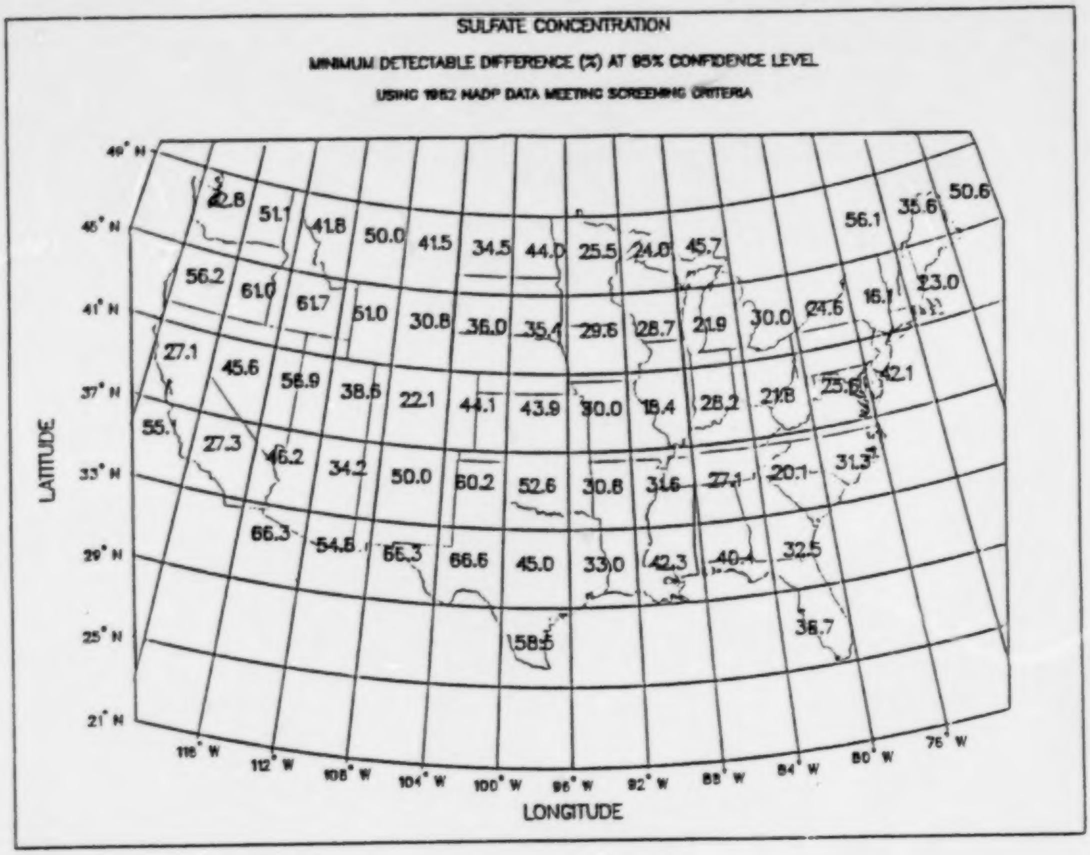
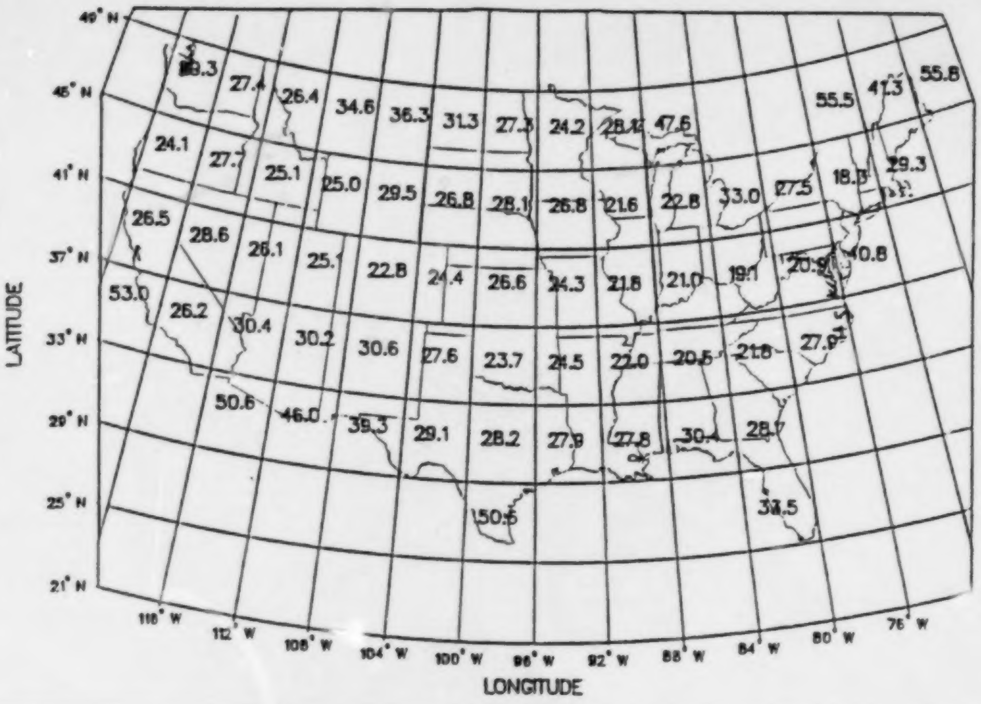
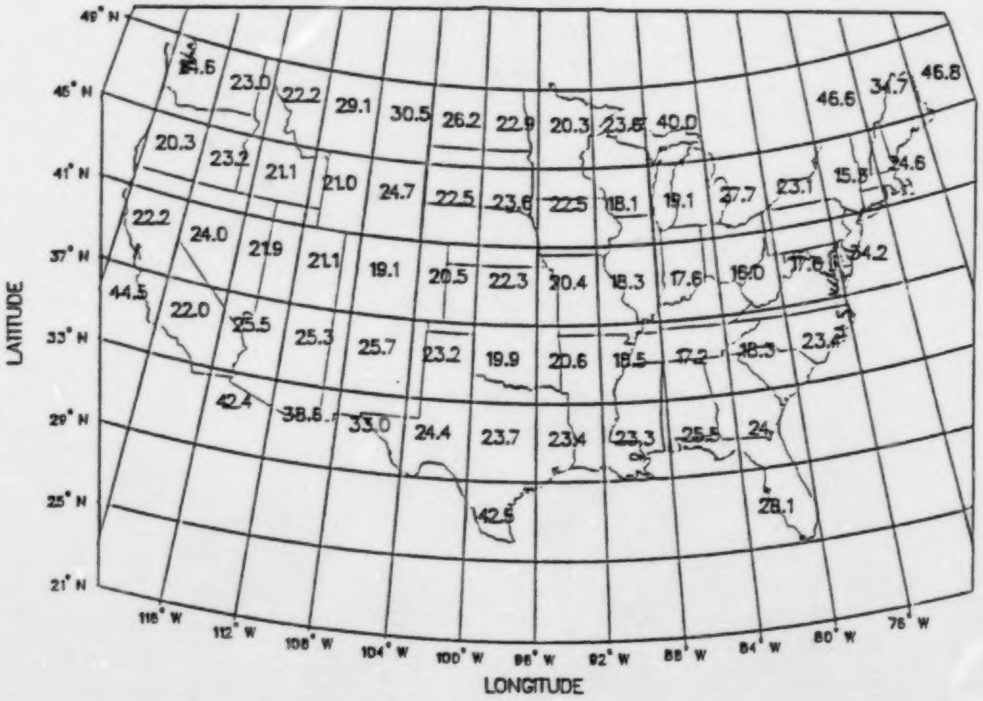

SULFATE CONCENTRATION
MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL
USING 1982 NADP DATA MEETING SCREENING CRITERIA
42.8
51.1
41.8
50.0
41.5
34.5
44.0
25.5
24.0
45.7
56.1
35.6
50.6
56.2
61.0
61.7
51.0
30.8
36.0
35.4
29.6
28.7
21.9
30.0
24.6
16.1
23.0
27.1
45.6
56.9
38.6
22.1
44.1
43.9
30.0
19.4
26.2
21.8
25.6
42.1
55.1
27.3
46.2
34.2
50.0
60.2
52.6
30.8
31.6
27.1
20.1
31.3
66.3
54.5
56.3
66.6
45.0
33.0
42.3
40.4
32.5
58.5
36.7
49° N
45° N
41° N
37° N
33° N
29° N
25° N
21° N
LATITUDE
116° W
112° W
108° W
104° W
100° W
96° W
92° W
88° W
84° W
80° W
76° W
LONGITUDE

Figure 29


NITRATE DEPOSITION

MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

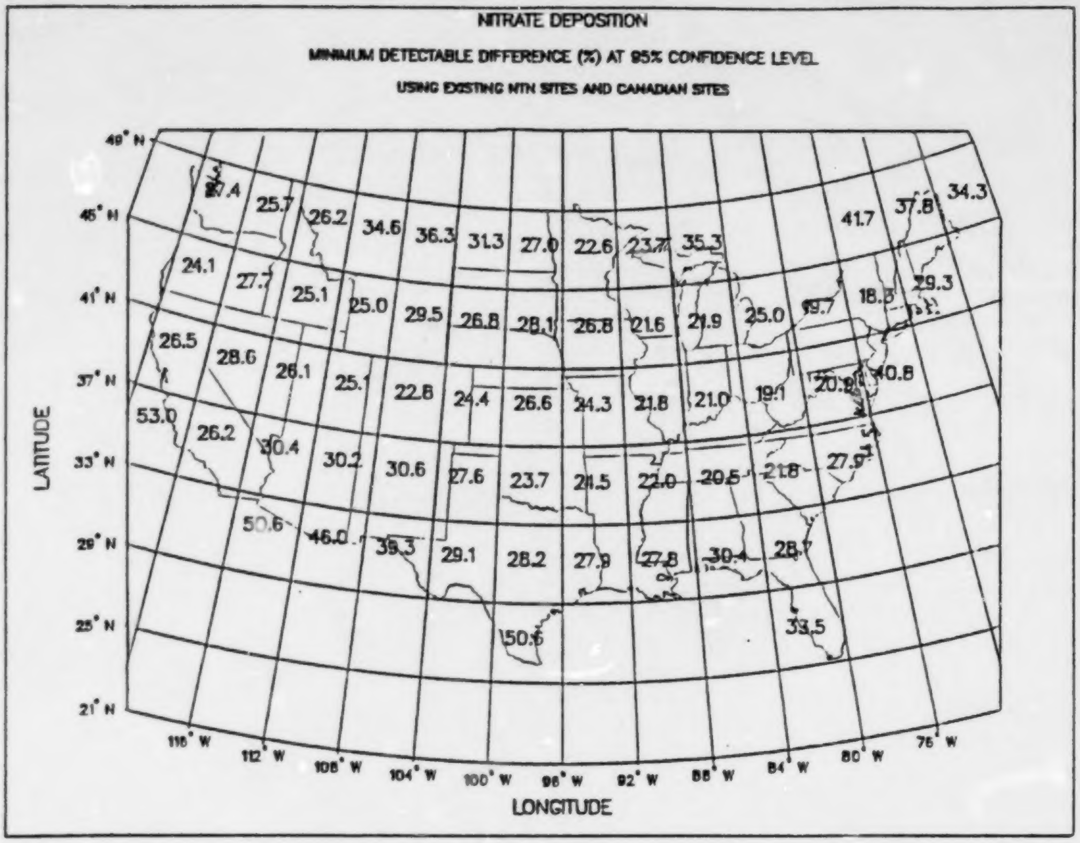
FOR EXISTING NTN SITES


NITRATE DEPOSITION

MINIMUM DETECTABLE DIFFERENCE (%) AT 90% CONFIDENCE LEVEL

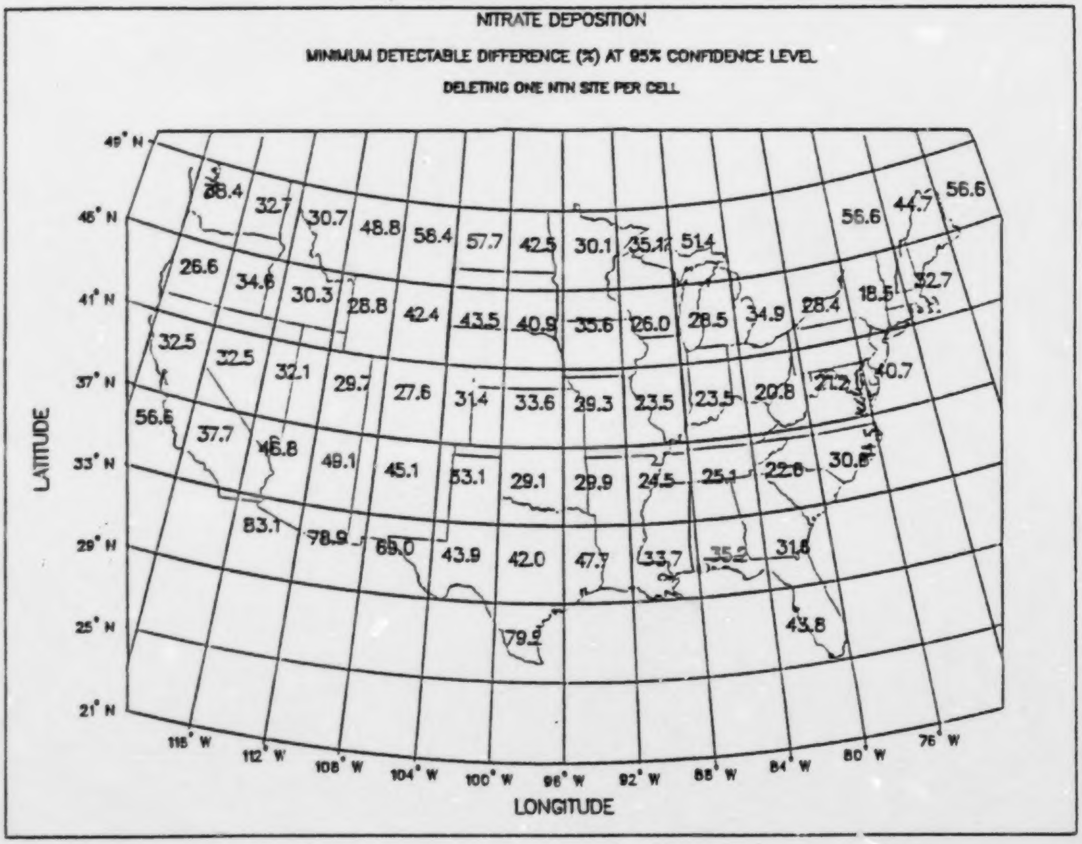
FOR EXISTING NTN SITES

Figure 30


NITRATE DEPOSITION

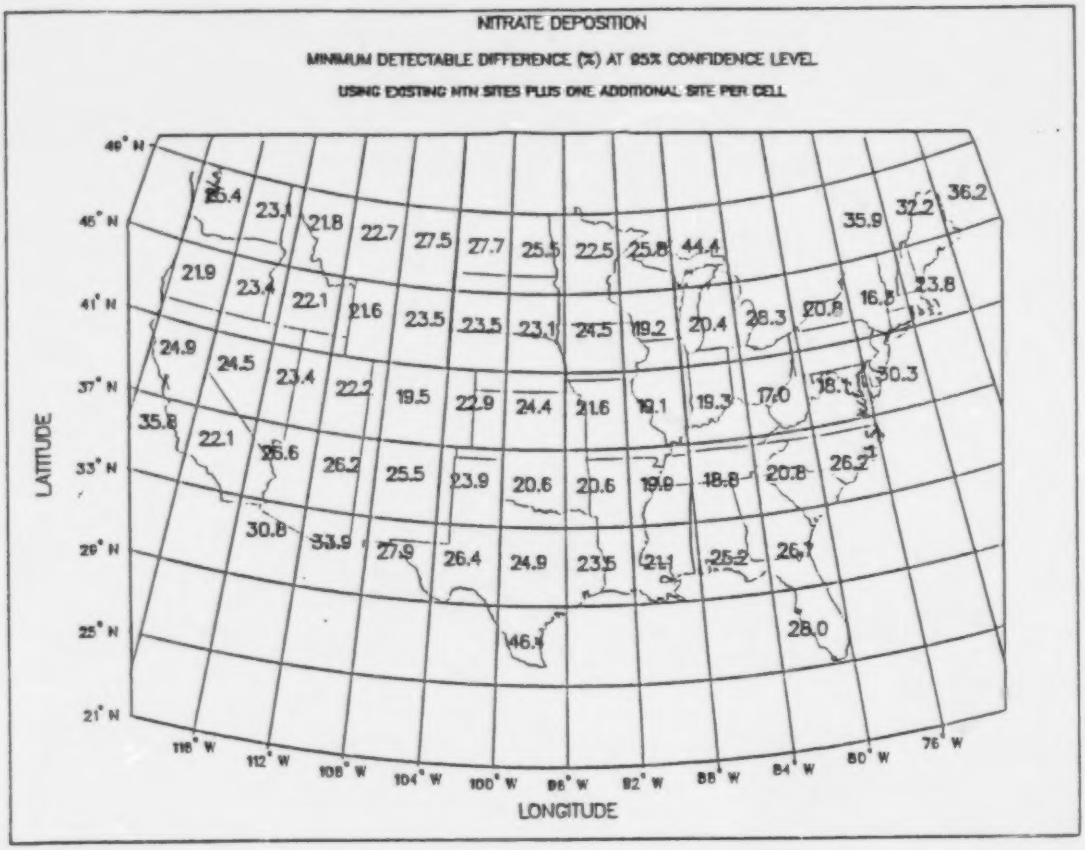
MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

USING EXISTING NTN SITES AND CANADIAN SITES


NITRATE DEPOSITION

MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

DELETING ONE NTN SITE PER CELL


NITRATE DEPOSITION
MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL
USING EXISTING NTN SITES PLUS ONE ADDITIONAL SITE PER CELL
49° N
45° N
41° N
37° N
33° N
29° N
25° N
21° N
LATITUDE
116° W
112° W
108° W
104° W
100° W
96° W
92° W
88° W
84° W
80° W
76° W
LONGITUDE
25.4
23.1
21.8
22.7
27.5
27.7
25.5
22.5
25.8
44.4
35.9
32.2
36.2
21.9
23.4
22.1
21.6
23.5
23.5
23.1
24.5
19.2
20.4
28.3
20.8
16.8
23.8
24.9
24.5
23.4
22.2
19.5
22.9
24.4
21.6
19.1
19.3
17.0
18.1
30.3
35.8
22.1
26.6
26.2
25.5
23.9
20.6
20.6
19.9
18.8
20.8
26.2
30.8
33.9
27.9
26.4
24.9
23.5
21.1
25.2
26.1
46.1
28.0

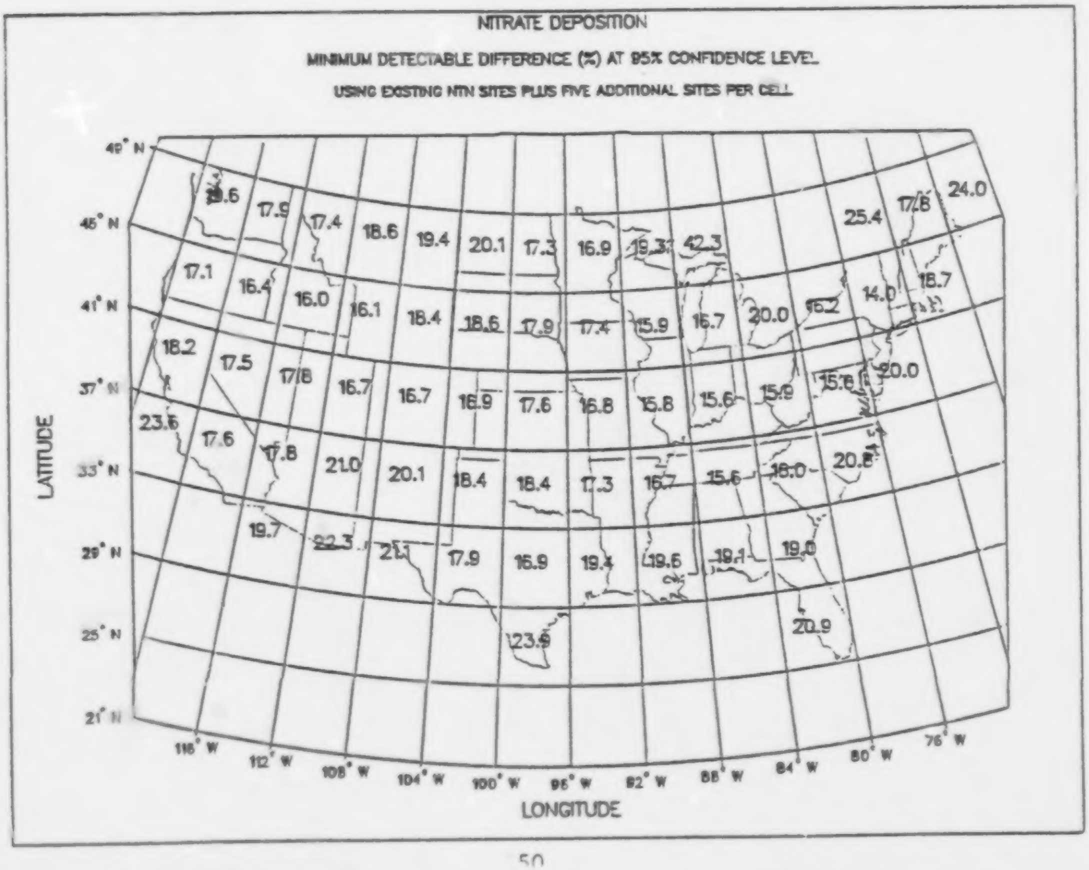
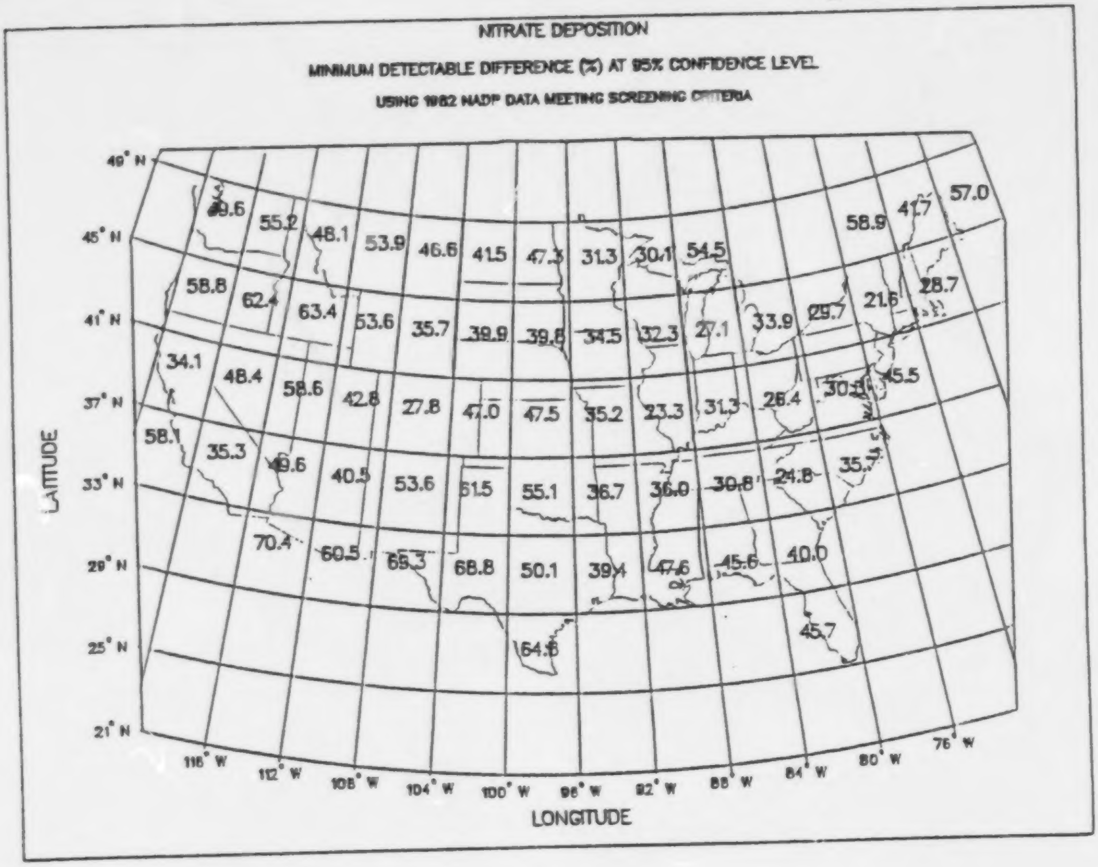

NITRATE DEPOSITION
MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL
USING EXISTING NTN SITES PLUS FIVE ADDITIONAL SITES PER CELL
49° N
45° N
41° N
37° N
33° N
29° N
25° N
21° N
LATITUDE
116° W
112° W
108° W
104° W
100° W
96° W
92° W
88° W
84° W
80° W
76° W
LONGITUDE
17.9
17.4
18.6
19.4
20.1
17.3
16.9
19.3
42.3
25.4
17.8
24.0
17.1
16.4
16.0
16.1
18.4
18.6
17.9
17.4
15.9
16.7
20.0
16.2
14.0
18.7
18.2
17.5
17.8
16.7
16.7
16.9
17.6
16.8
15.8
15.6
15.9
15.8
20.0
23.5
17.6
17.8
21.0
20.1
18.4
18.4
17.3
16.7
15.6
18.0
20.8
19.7
22.3
21.1
17.9
16.9
19.4
19.6
19.1
19.0
23.9
20.9

Figure 32

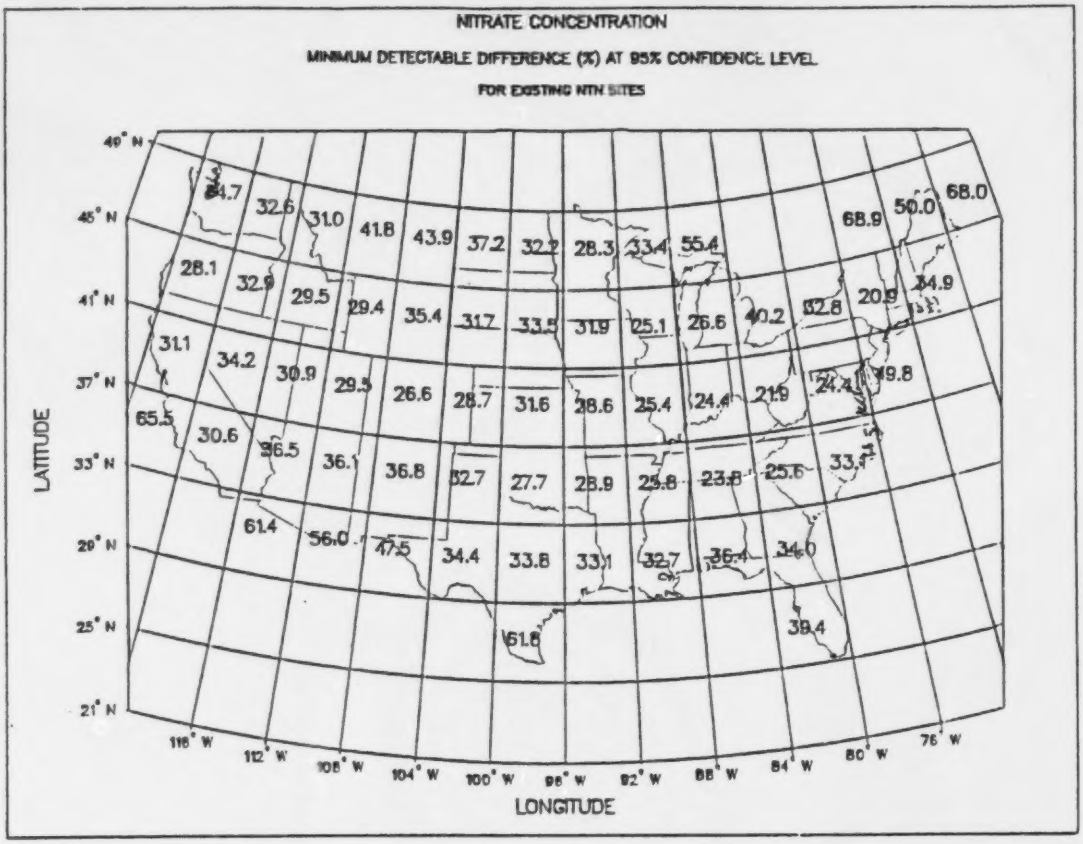


NITRATE DEPOSITION

MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

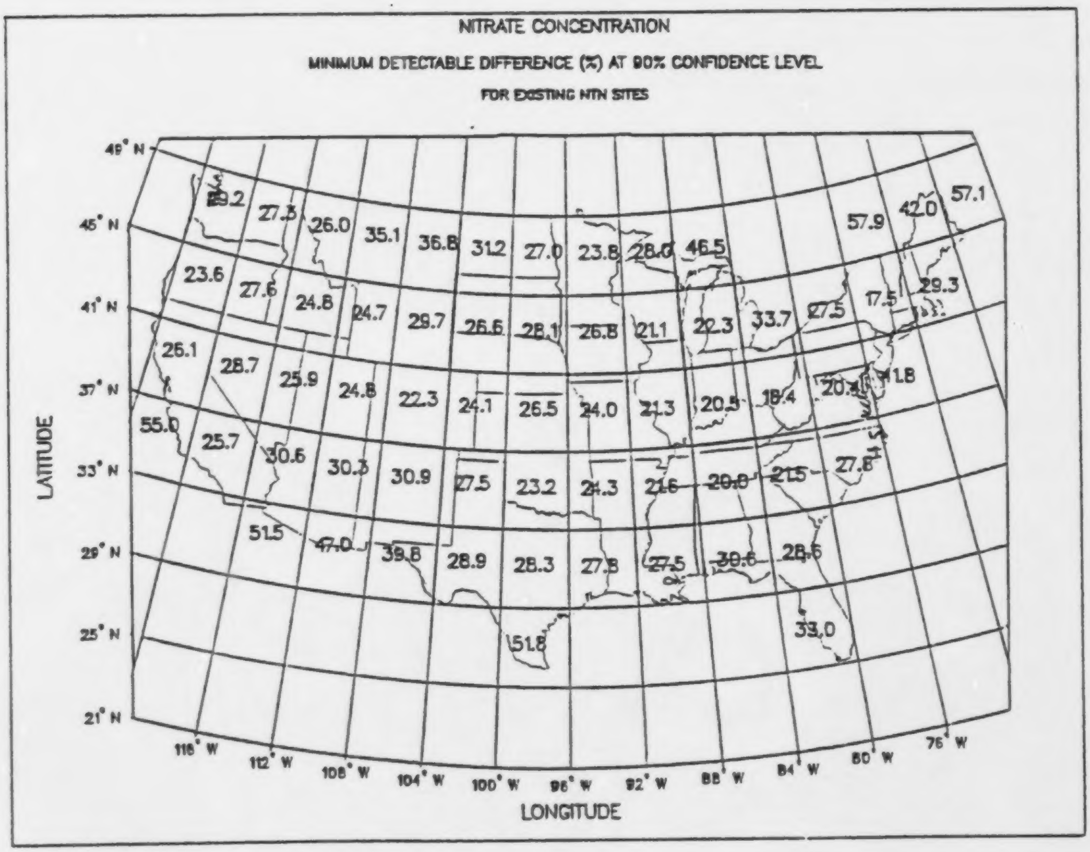
USING 1982 NADP DATA MEETING SCREENING CRITERIA

Figure 33


NITRATE CONCENTRATION

MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

FOR EXISTING NTN SITES


NITRATE CONCENTRATION

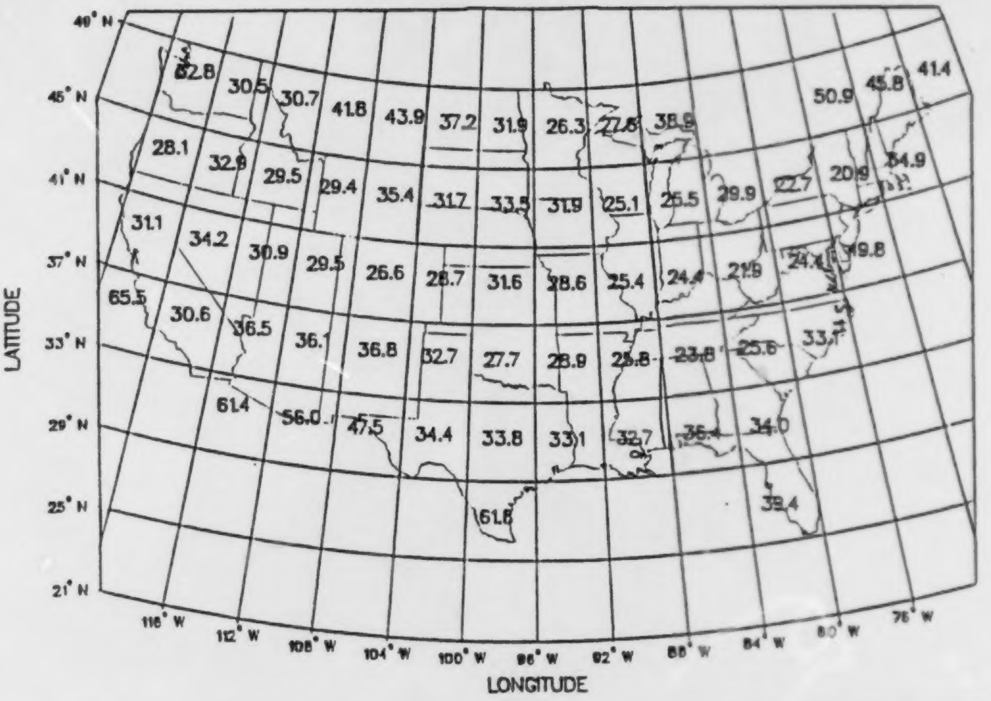
MINIMUM DETECTABLE DIFFERENCE (%) AT 90% CONFIDENCE LEVEL

FOR EXISTING NTN SITES

NITRATE CONCENTRATION

MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

USING EXISTING NTN SITES AND CANADIAN SITES



NITRATE CONCENTRATION

MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

DELETING ONE NTN SITE PER CELL

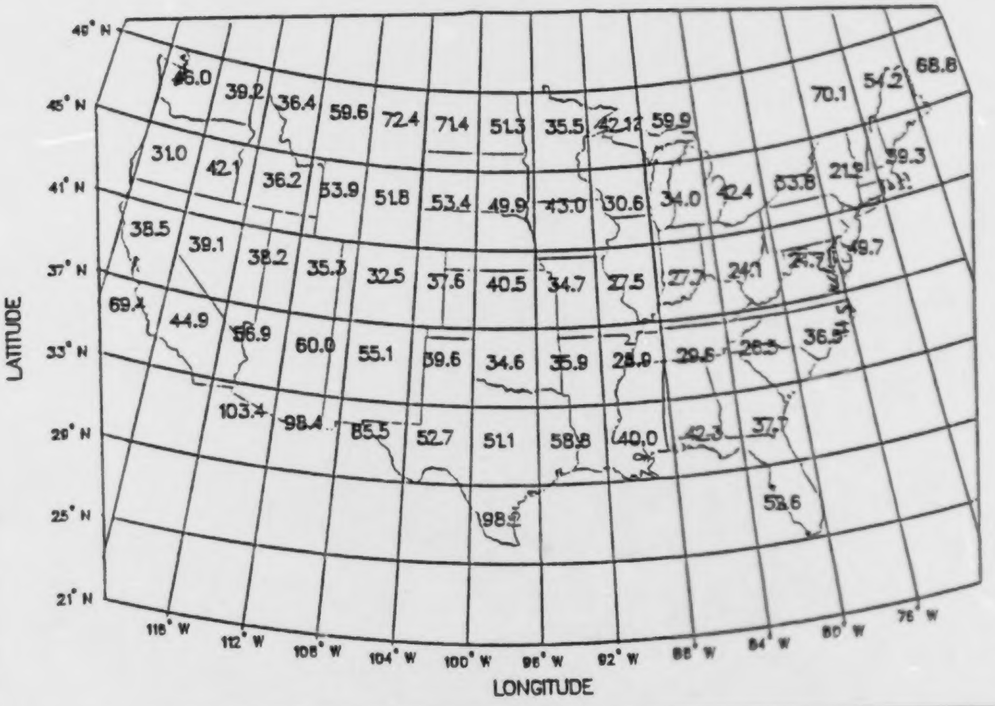
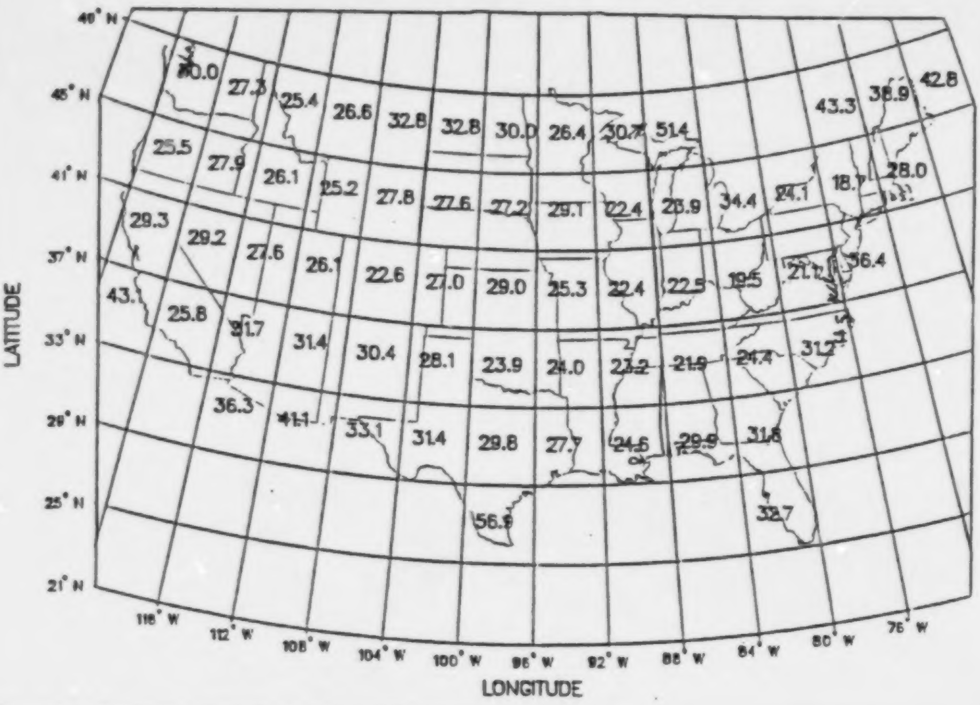


Figure 35

NITRATE CONCENTRATION

MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

USING EXISTING NTN SITES PLUS ONE ADDITIONAL SITE PER CELL



NITRATE CONCENTRATION

MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

USING EXISTING NTN SITES PLUS FIVE ADDITIONAL SITES PER CELL

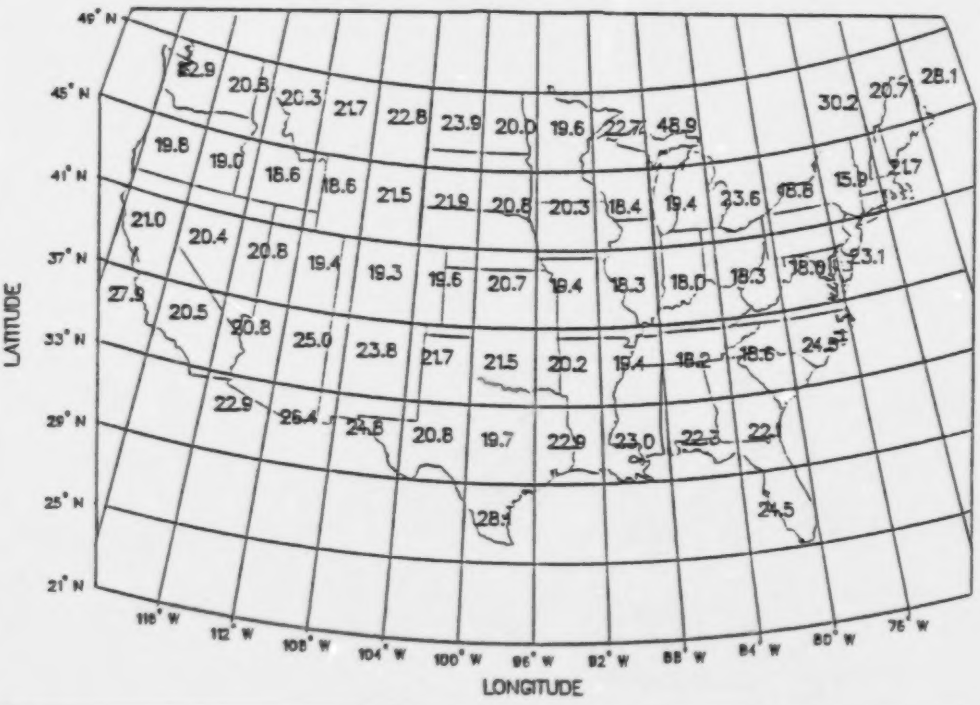
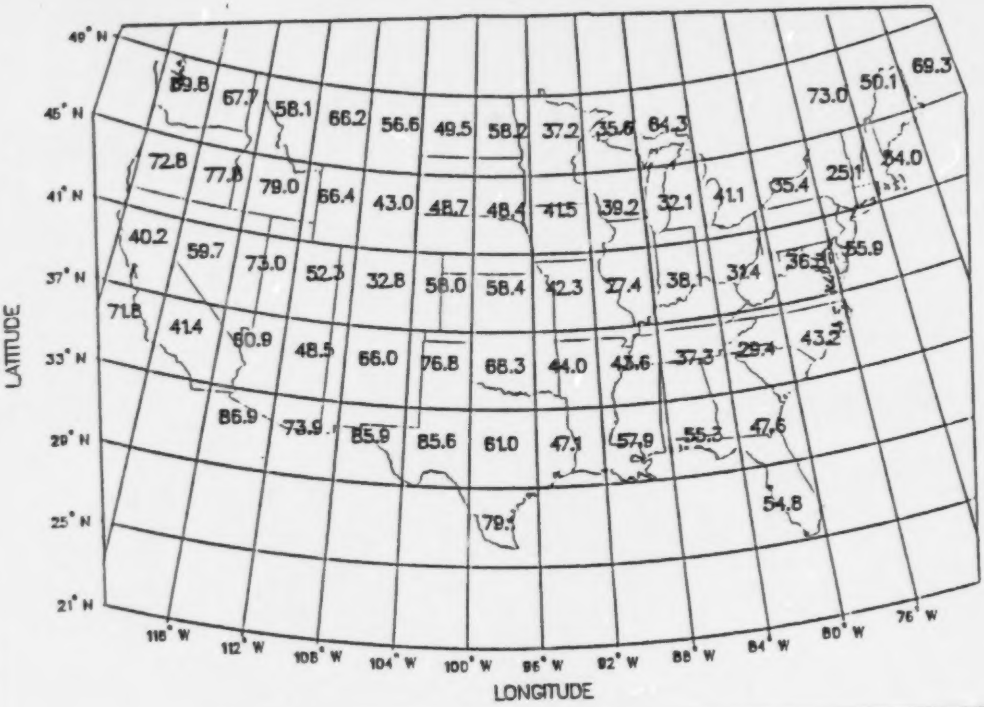


Figure 36



NITRATE CONCENTRATION

MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

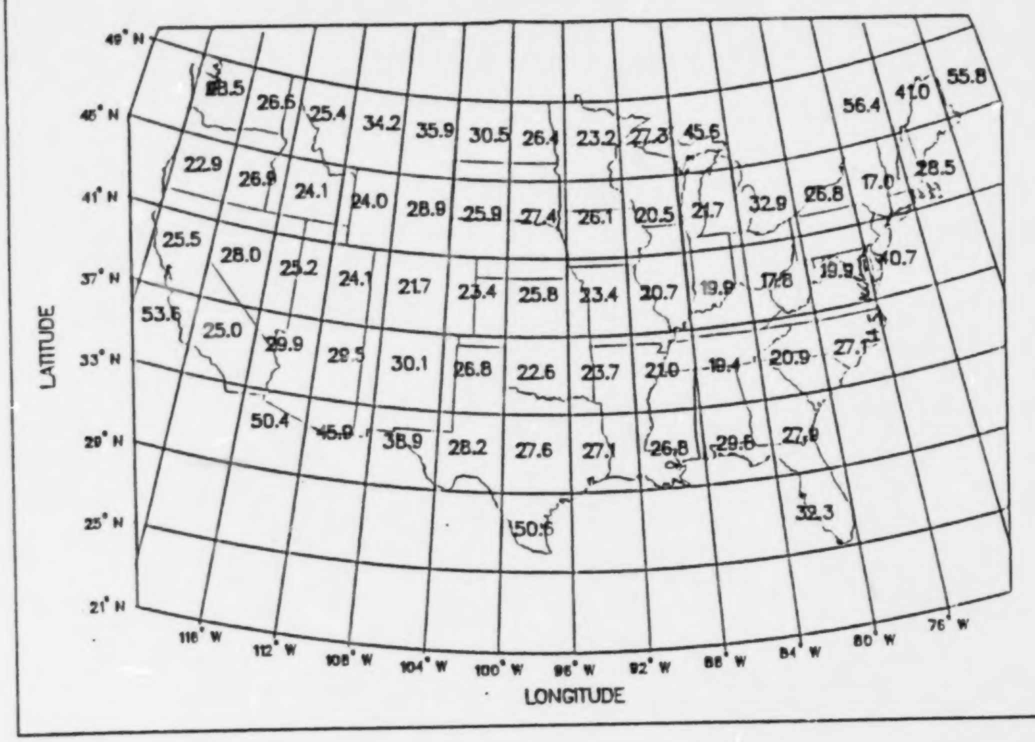
USING 1982 NADP DATA MEETING SCREENING CRITERIA

Figure 37

HYDROGEN ION DEPOSITION

MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

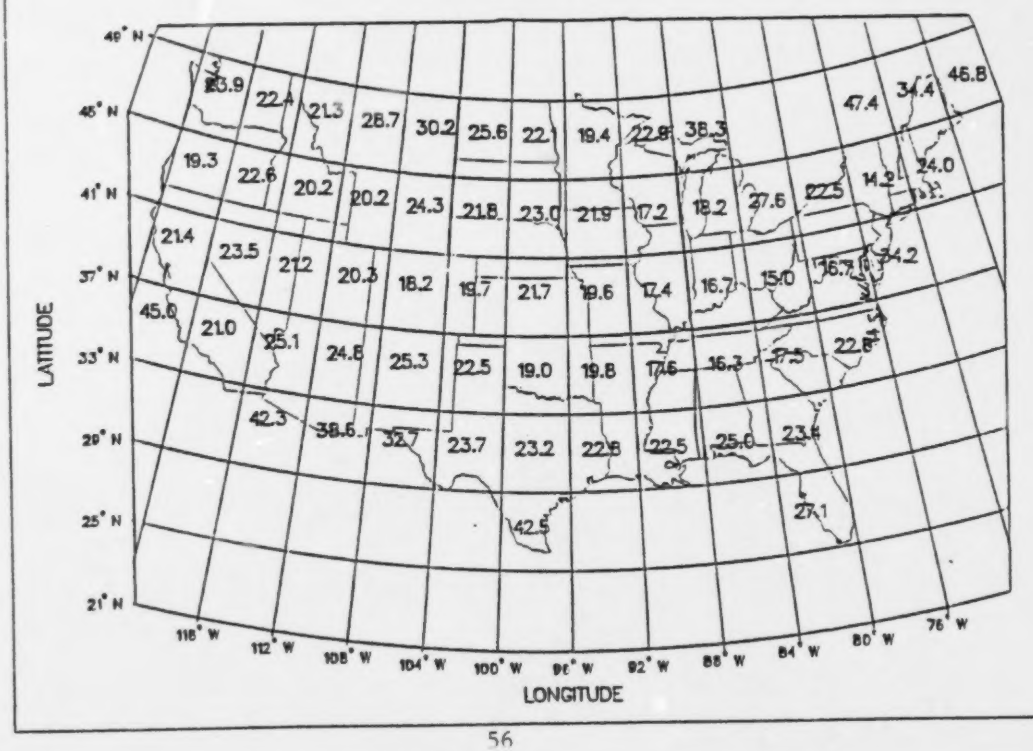
FOR EXISTING NTN SITES



HYDROGEN ION DEPOSITION

MINIMUM DETECTABLE DIFFERENCE (%) AT 90% CONFIDENCE LEVEL

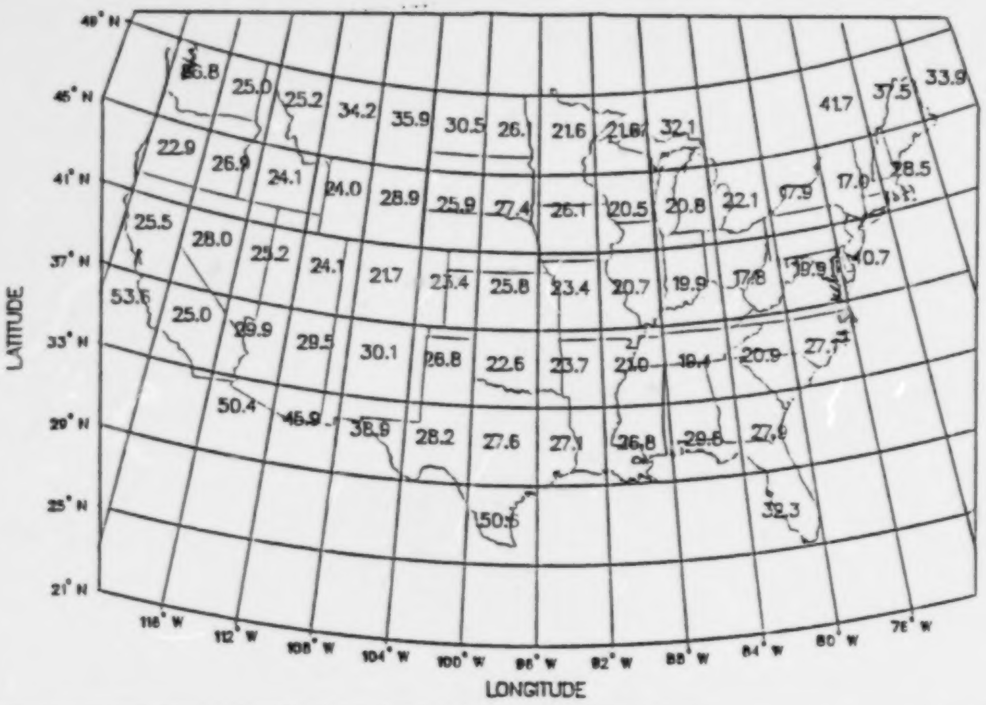
FOR EXISTING NTN SITES



HYDROGEN ION DEPOSITION

MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

USING EXISTING NTN SITES AND CANADIAN SITES



HYDROGEN ION DEPOSITION

MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

DELETING ONE NTN SITE PER CELL

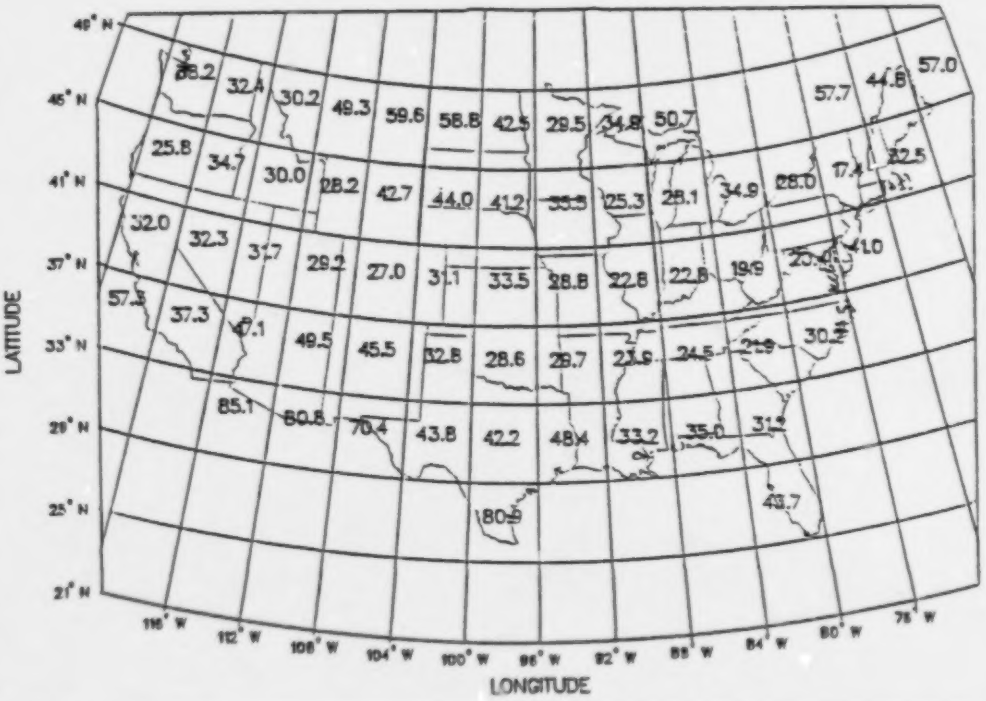
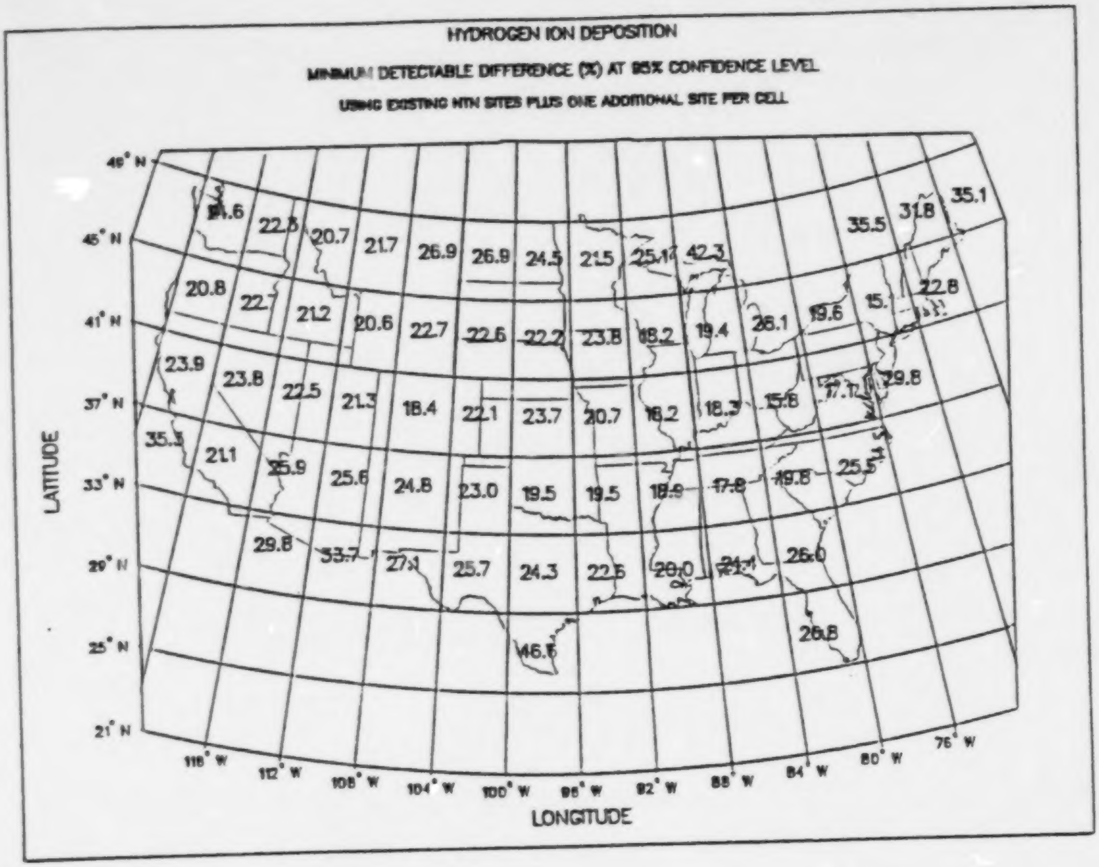
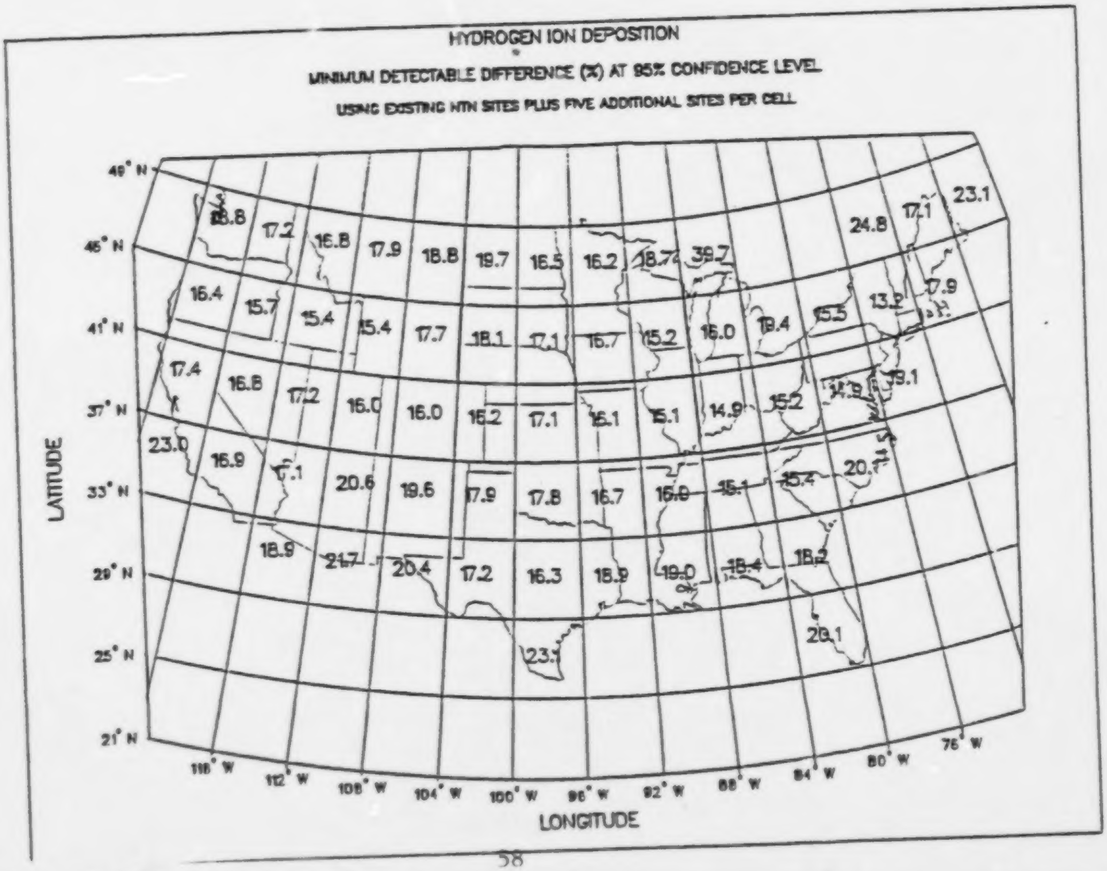


Figure 39


HYDROGEN ION DEPOSITION

MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

USING EXISTING NTN SITES PLUS ONE ADDITIONAL SITE PER CELL


HYDROGEN ION DEPOSITION

MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

USING EXISTING NTN SITES PLUS FIVE ADDITIONAL SITES PER CELL

Figure 40

HYDROGEN ION DEPOSITION

MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

USING 1982 NADP DATA MEETING SCREENING CRITERIA

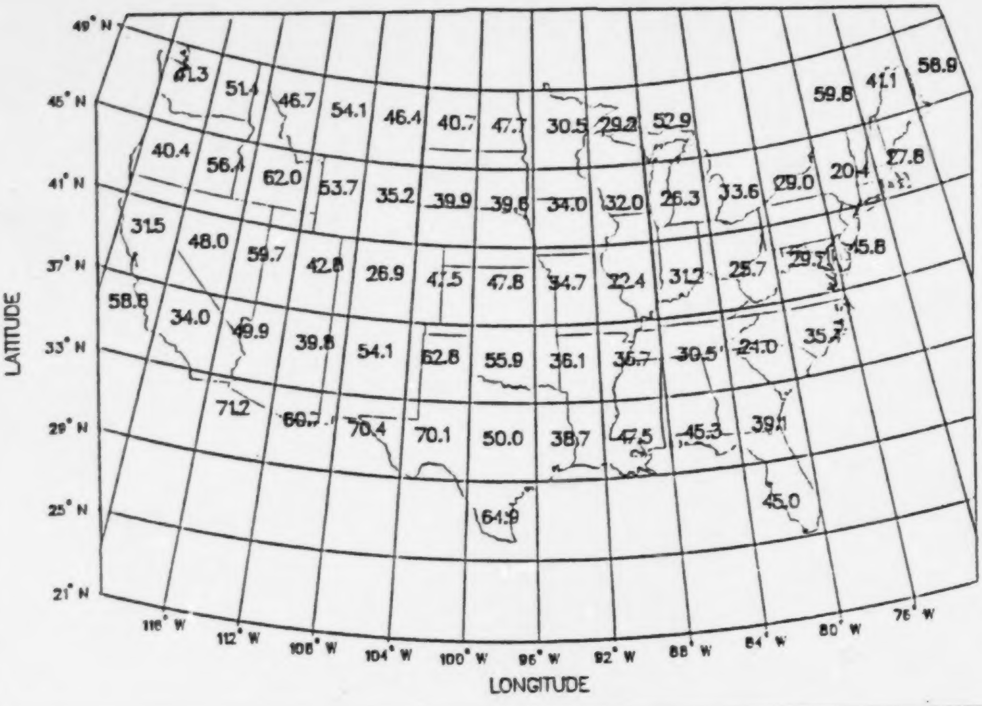
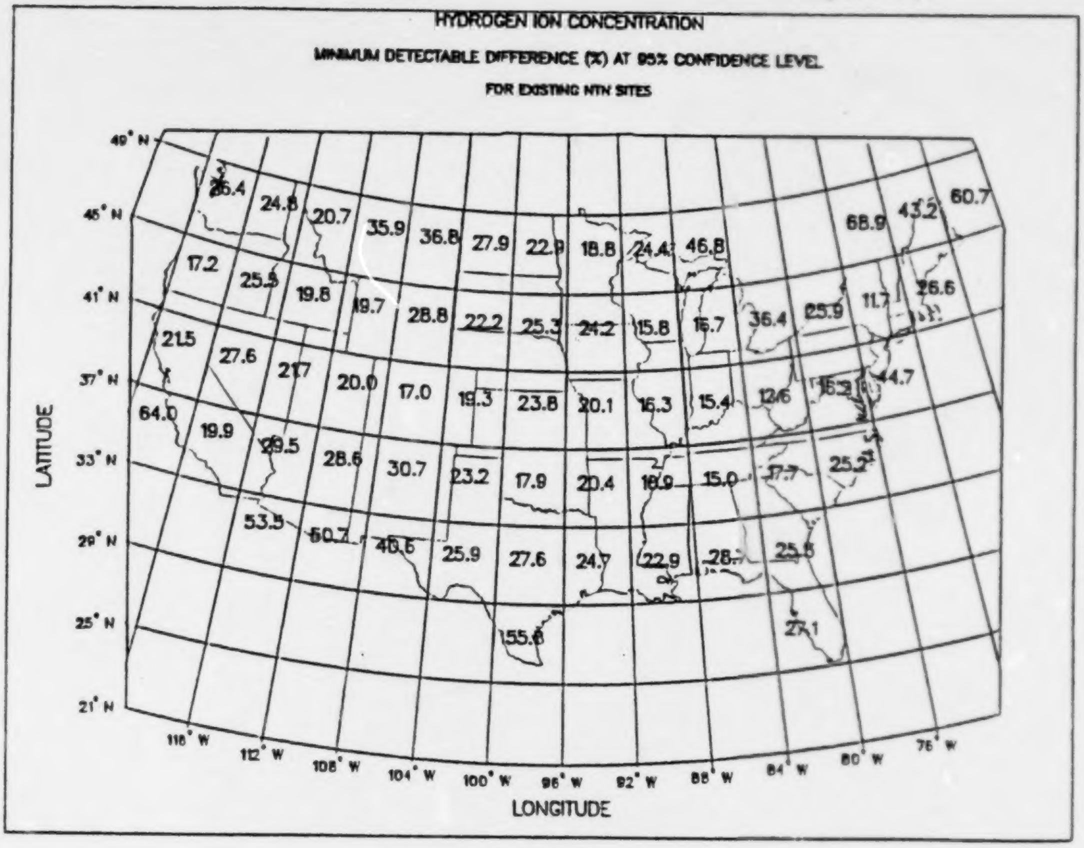
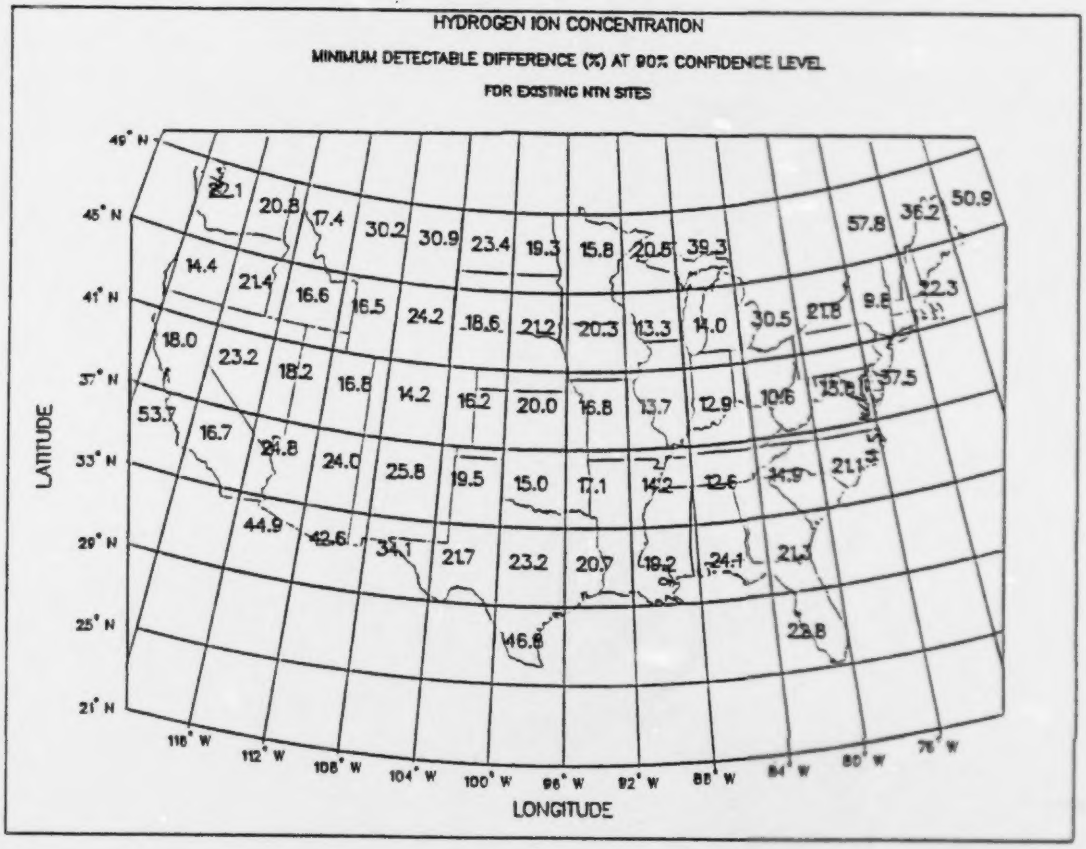


Figure 41


HYDROGEN ION CONCENTRATION

MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

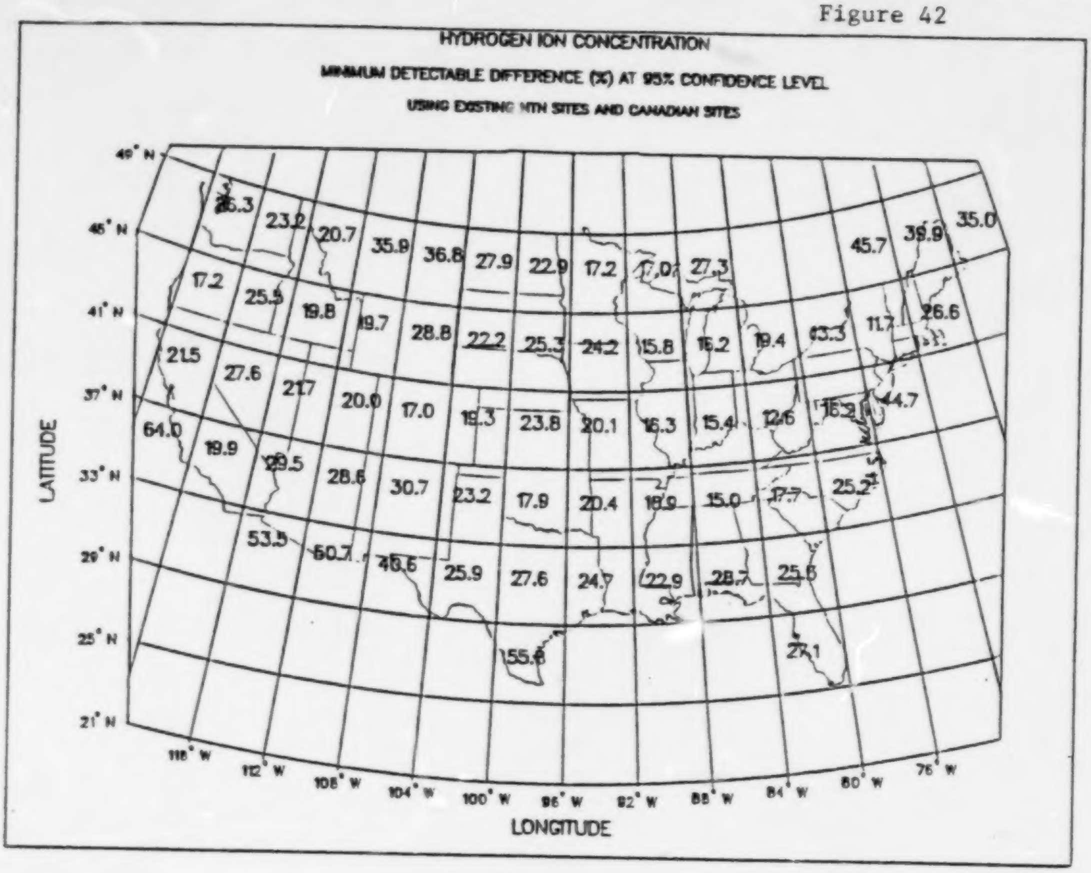
FOR EXISTING NTN SITES


HYDROGEN ION CONCENTRATION

MINIMUM DETECTABLE DIFFERENCE (%) AT 90% CONFIDENCE LEVEL

FOR EXISTING NTN SITES

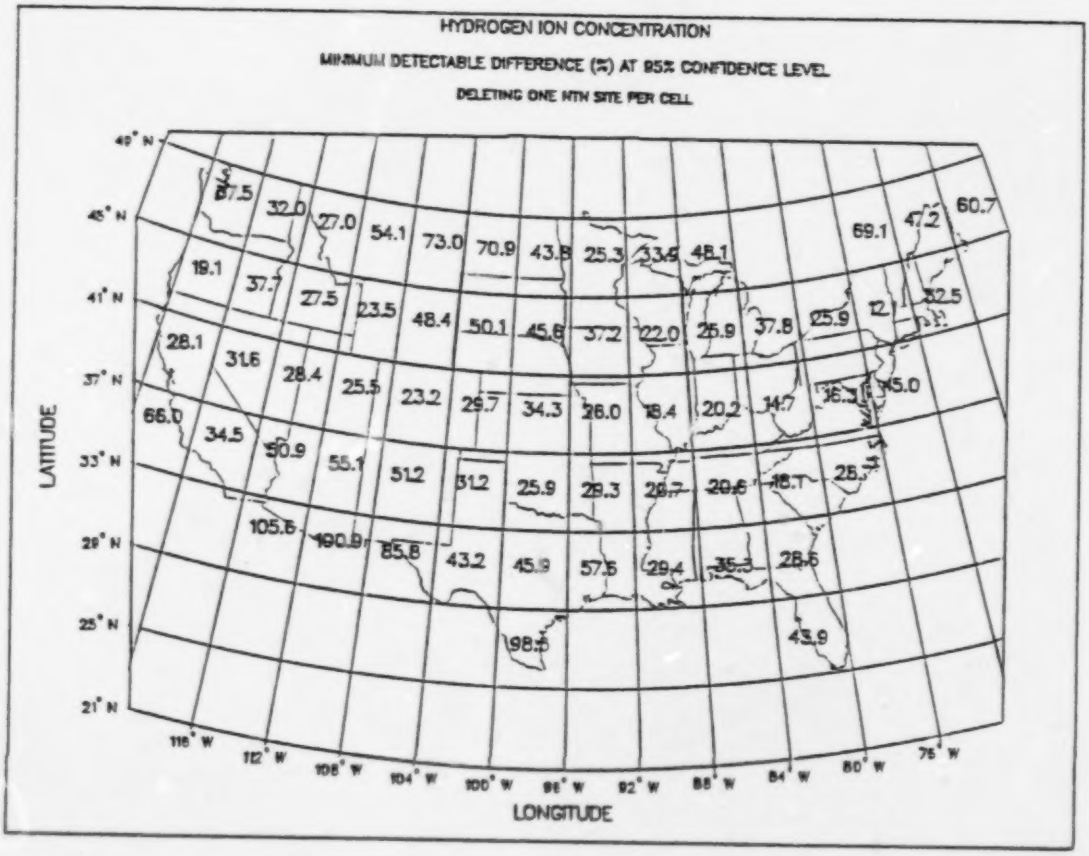
Figure 42



HYDROGEN ION CONCENTRATION

MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

USING EXISTING NTN SITES AND CANADIAN SITES

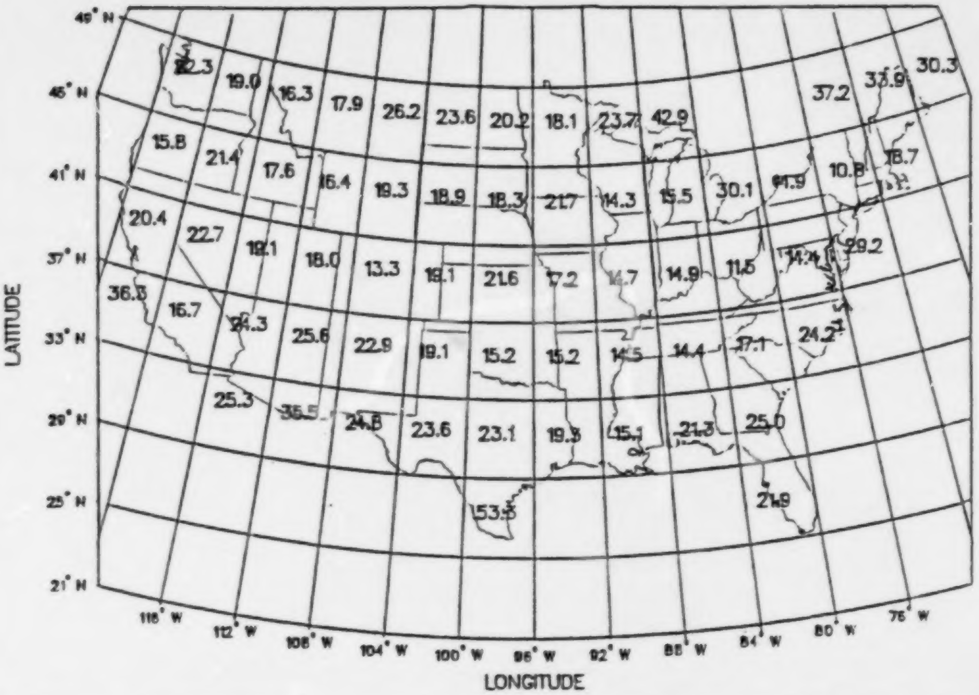


HYDROGEN ION CONCENTRATION

MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

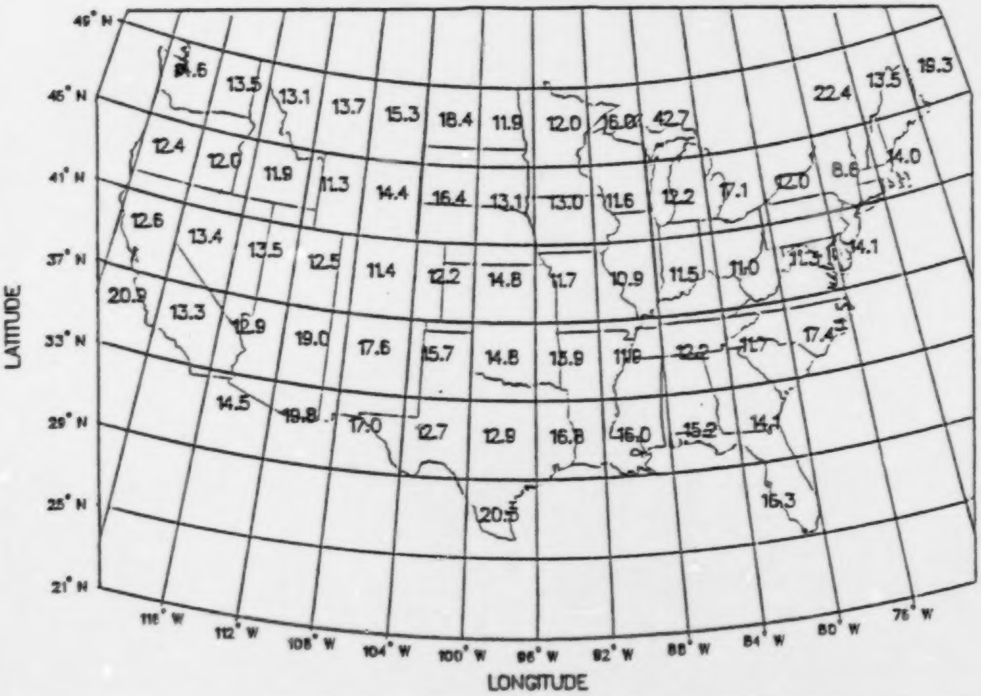
DELETING ONE NTN SITE PER CELL

Figure 43


HYDROGEN ION CONCENTRATION

MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

USING EXISTING HTH SITES PLUS ONE ADDITIONAL SITE PER CELL


HYDROGEN ION CONCENTRATION

MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL

USING EXISTING HTH SITES PLUS FIVE ADDITIONAL SITES PER CELL

Figure 44

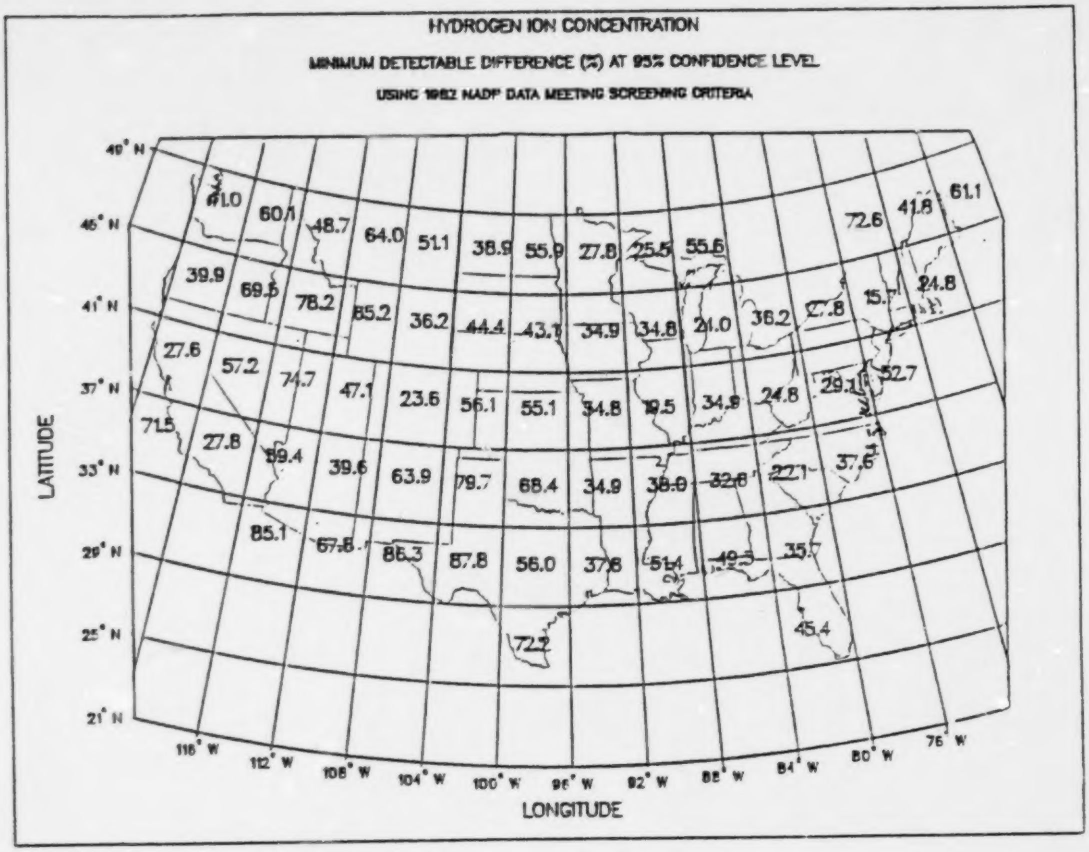

HYDROGEN ION CONCENTRATION
MINIMUM DETECTABLE DIFFERENCE (%) AT 95% CONFIDENCE LEVEL
USING 1982 NADP DATA MEETING SCREENING CRITERIA
LATITUDE
49° N
45° N
41° N
37° N
33° N
29° N
25° N
21° N
41.0
60.1
48.7
64.0
51.1
38.9
55.9
27.8
25.5
55.6
72.6
41.8
61.1
39.9
69.5
78.2
85.2
36.2
44.4
43.1
34.9
34.8
21.0
36.2
27.8
15.7
24.8
27.6
57.2
74.7
47.1
23.6
56.1
55.1
34.8
19.5
34.9
24.8
29.1
52.7
71.5
27.8
89.4
39.6
63.9
79.7
68.4
34.9
38.0
32.8
27.1
37.6
85.1
67.8
86.3
87.8
56.0
37.8
51.4
49.5
35.7
72.2
45.4
116° W
112° W
108° W
104° W
100° W
96° W
92° W
88° W
84° W
80° W
76° W
LONGITUDE

Table 1

NATIONAL TRENDS NETWORK SITES

STATE	LOCATION	LATITUDE (Degrees, Minutes)	LONGITUDE (Degrees, Minutes)
AL	Blackbelt Agr Station	3228	08715
AL	Sand Mtn Agr Ctr	3416	08559
AR	Fayetteville	3606	09410
AR	Warren	3336	09206
AR	Caddo Valley	3411	09306
AZ	Grand Canyon NP	3604	11209
AZ	Organ Pipe Cactus NM	3157	11248
AZ	Oliver Knoll	3304	10952
CA	Davis	3832	12147
CA	Montague	4145	12237
CA	Yosemite NP	3748	11952
CA	Chuchupate Ranger Sta	3448	11901
CA	Sequoia-Kings Canyon NP	3634	11847
CA	Tanbark Flat	3412	11746
CA	Hopland	3900	12305
CO	Pawnee	4048	10445
CO	Las Animas Fish Hatchery	3807	10319
CO	Manitou	3906	10506
CO	Alamosa	3727	10552
CO	Mesa Verde NP	3712	10829
CO	Sand Spring	4030	10742
FL	Bradford Forest	2958	08212
FL	Quincy	3033	08436
FL	Everglades NP	2524	08042
FL	Verna Well Field	2723	08217
GA	Tifton	3128	08332
GA	Georgia Station	3311	08424
IA	McNay Mem Res Ctr	4058	09323
IA	Big Springs Fish Hatchery	4255	09128
ID	Headquarters	4638	11549
ID	Smiths Ferry	4418	11605
ID	Craters of the Moon NM	4328	11334
IL	Dixon Springs Agr Ctr	3726	08840
IL	Bondville	4003	08822
IL	Salem	3839	08858
IL	Shabbona	4150	08851
IL	Monmouth	4056	09045
IL	Argonne	4142	08800
IN	Huntington Reservoir	4050	08528
IN	SW Purdue Agr Ctr	3844	08729
KS	Farlington Fish Hatchery	3739	09448
KS	Konza Prairie	3906	09637
KS	Lake Scott State Park	3840	10055
KY	Perryville Battlefield	3741	08457
KY	Land Between the Lakes	3647	08804
KY	Clark Fish Hatchery	3807	08333
KY	Lilley Cornett Woods	3705	08300

Table 1 (continued)

STATE	LOCATION	LATITUDE (Degrees, Minutes)	LONGITUDE (Degrees, Minutes)
LA	Iberia Res Sta	2956	09143
LA	SE Research Sta	3048	09011
MA	Quabbin Reservoir	4222	07223
MA	East	4223	07113
MD	Wye	3855	07609
ME	Bridgton	4406	07044
ME	Acadia NP	4422	06816
ME	Greenville Station	4529	06940
ME	Presque Isle	4639	06801
MI	Raco	4623	08444
MI	Kellogg Biological Sta	4225	08524
MI	Douglas Lake	4534	08441
MI	Wellston	4413	08549
MN	Fernberg	4757	09130
MN	Camp Ripley	4615	09430
MN	Lamberton	4414	09518
MN	Marcell Exp Forest	4732	09328
MO	Ashland Wildlife Area	3845	09212
MO	University Forest	3655	09019
MS	Clinton	3218	09019
MS	Coffeyville Pines	3400	08948
MT	Glacier Fire Weather Sta	4831	11400
MT	Custer Battlefield NM	4534	10726
MT	Clancy	4629	11204
MT	Havre Exp Sta	4830	01948
NC	Coweeta	3504	08326
NC	Finley Farm	3544	07841
NC	Lewiston	3608	07711
NC	Piedmont Research Sta	3542	08037
NC	Clinton Crops Res Ctr	3501	07817
NC	Jordan Creek	3458	07932
ND	Icelandic State Park	4847	09745
ND	Theodore Roosevelt NP	4736	10316
ND	Woodworth	4707	09914
NE	North Platte Agr Sta	4108	10045
NE	Mead	4109	09630
NH	Hubbard Brook	4357	07142
NJ	Washington Crossing	4019	07451
NM	Cuba	3602	10658
NV	Saval Ranch	4117	11550
NV	Red Rock Canyon	3608	11526
NV	Lehman Caves NM	3900	11413
NV	Smith Valley	3848	11915
NY	Aurora Res Farm	4244	07640
NY	Whiteface Mountain	4423	07352
NY	Chautauqua	4218	07924
NY	Jasper	4206	07732
NY	Bennett Bridge	4332	07557
NY	Bisquit Brook	4200	07430
NY	West Point	4121	07402

STATE	LOCATION	LATITUDE (Degrees, Minutes)	LONGITUDE (Degrees, Minutes)
NY	Huntington Wildlife	4358	07413
OH	Delaware	4021	08304
OH	Caldwell	3948	08132
OH	Wooster	4047	08156
OH	Oxford	3932	08443
OK	Great Plains Apiaries	3459	09731
OK	Salt Plains NWR	3648	09813
OK	Goodwell	3635	10137
OR	Hyslop Farm	4438	12311
OR	Andrews Exp Forest	4413	12215
OR	Starkey Exp Forest	4514	11831
OR	Vines Hill	4354	11726
OR	Silver Lake Ranger Sta	4307	12103
PA	Kane Exp Forest	4136	07846
PA	Leading Ridge	4040	07756
PA	Milford	4120	07449
PA	Penn State	4047	07757
SC	Santee NWR	3329	08022
SD	Huron Well Field	4422	09817
SD	Cottonwood	4357	10152
TN	Giles County	3517	08654
TN	Hatchie NWR	3528	08910
TN	Walker Branch	3558	08417
TN	Great Smoky Mtn NP	3540	08335
TX	Forest Seed Center	3134	09452
TX	LBJ National Grasslands	3324	09738
TX	Sonora Res Sta	3017	10033
TX	Attwater Prairie Chicken NWR	2940	09615
TX	Throckmorton Res Sta	3316	09913
TX	Beeville	2828	09742
TX	Guadalupe Mountains NP	3155	10449
TX	Big Bend NP	2918	10311
TX	Muleshoe NWR	3357	10240
UT	Bryce Canyon	3737	11210
UT	Green River	3900	11010
UT	Logan	4140	11154
VA	Hortons Station	3720	08033
VA	Charlottesville	3802	07833
VA	Shenandoah NP	3831	07826
VT	Bennington	4253	07310
VT	Underhill	4432	07252
WA	Palouse Cons Farm	4646	11710
WA	Olympic NP	4752	12356
WA	Marblemount	4833	12127
WI	Lake Dubay	4440	08939
WI	Lake Geneva	4235	08830
WI	Spooner	4549	09153
WI	Trout Lake	4603	08939
WV	Parsons	3905	07940
WV	Babcock State Park	3759	08057

STATE	LOCATION	LATITUDE (Degrees, Minutes)	LONGITUDE (Degrees, Minutes)
WY	Newcastle	4352	10412
WY	Pinedale	4256	10947
WY	Yellowstone NP	4455	11025

Table 2

SULFATE DEPOSTION

STATION	STATE	1981	1982	1983	1984
BLACKBELT	ALABAMA	.	.	F	
CROSSVILLE	ALABAMA	.	.	.	F
BUFFALO RIVER	ARKANSAS	.	F	F	F
CADDO VALLEY	ARKANSAS	.	.	.	+
WARREN 2WSW	ARKANSAS	.	F		F
AUSTIN-CARY FOREST	FLORIDA	F	.	.	.
BRADFORD FOREST	FLORIDA				F
CIFANT	FLORIDA	.	.	F	F
EVERGLADES NAT. PA	FLORIDA	F	-	F	F
QUINCY	FLORIDA	.	.	.	F
VERNA WELL FIELD	FLORIDA	.	.	F	
BELLVILLE	GEORGIA	.	.	F	F
GEORGIA STATION	GEORGIA				-
TIFTON, ARS	GEORGIA	.	.	F	F
ARGONNE	ILLINOIS	-	+	+	+
BONDVILLE	ILLINOIS			F	-
BONDVILLE INTERCOM	ILLINOIS	.	.	F	F
DIXON SPRINGS	ILLINOIS		+	+	+
NIARC	ILLINOIS	F			-
SALEM	ILLINOIS	F			+
SOUTHERN ILL U	ILLINOIS				
HUNTINGTON	INDIANA	.	.	F	
INDIANA DUNES	INDIANA	++			
PURDUE U AG FARM	INDIANA	.	F		+
VINCENNES	INDIANA	.	.	.	F
BIG SPRINGS FISH H	IOWA	.	.	.	F
MCNAY RESEARCH STA	IOWA	.	.	.	F
CLARK STATE FISH H	KENTUCKY	.	.	F	F
LAND BETWEEN THE L	KENTUCKY	.	.	.	F
LILLEY CORNETT WOO	KENTUCKY	.	.	F	
PERRYVILLE	KENTUCKY	.	.	F	-
IBERIA	LOUISIANA	.	F	F	
N LA HILL FARM	LOUISIANA	.	F	F	F
SOUTHEAST	LOUISIANA	.	.	F	F
ACADIA < 11/81	MAINE	F	.	.	+
ACADIA > 11/81	MAINE	F	F	F	
BRIDGTON	MAINE	-	F	F	
CARIBOU (A)	MAINE			F	
GREENVILLE STATION	MAINE	-			
PRESQUE ISLE	MAINE	.	.	.	F
WHITE ROCK	MARYLAND	.	.	.	F
WYE	MARYLAND	.	.	F	
CADWELL	MASSACHUSETTS	.	F	F	F
NACL	MASSACHUSETTS	F	+	F	
EAST	MASSACHUSETTS	.			

Table 2 (continued)

SULFATE DEPOSTION

STATION	STATE	1981	1982	1983	1984
CHASSELL	MICHIGAN	.	.	F	
DOUGLAS LAKE	MICHIGAN	F			F
HOUGHTON	MICHIGAN	F	F	F	.
ISLE ROYAL PARK	MICHIGAN	F	F	F	F
KELLOGG	MICHIGAN	-			F
RACO	MICHIGAN	.	.	.	F
WELLSTON	MICHIGAN	F	F		+
FERNBERG	MINNESOTA	F			F
MARCELL	MINNESOTA				F
CLINTON	MISSISSIPPI	.	.	.	F
COFFEEVILLE	MISSISSIPPI	.	.	.	F
MERIDIAN	MISSISSIPPI				
ASHLAND	MISSOURI	F			
UNIVERSITY FOREST	MISSOURI	F			-
HUBBARD BROOK	NEW HAMPSHIRE	++			
PRINCETON	NEW JERSEY	F	.	.	.
WASHINGTON XING	NEW JERSEY	F	F	F	
AURORA	NEW YORK				
BENNETT BRIDGE	NEW YORK	F	F	++	+
BISCUIT BROOK	NEW YORK	.	.	F	F
CHAUTAUQUA	NEW YORK				
HUNTINGTON	NEW YORK	F			--
JASPER	NEW YORK	F	-	--	F
KNOBIT	NEW YORK			-	F
STILWELL LAKE	NEW YORK			+	F
WEST POINT	NEW YORK	.	.	F	
WHITEFACE	NEW YORK	.	.	.	F
CLINTON STATION	NORTH CAROLINA	+	F		
COWEETA	NORTH CAROLINA			F	F
FINLEY (A)	NORTH CAROLINA	-			
JORDAN CREEK	NORTH CAROLINA	.	.	F	F
LEWISTON	NORTH CAROLINA	-			
PIEDMONT STATION	NORTH CAROLINA				
R TRIANGLE INST	NORTH CAROLINA			.	.
R TRIANGLE PARK	NORTH CAROLINA			F	.
CALDWELL	OHIO	+			
DELAWARE	OHIO	-			-
OXFORD	OHIO	.	.	.	F
WOOSTER	OHIO				
KANE	PENNSYLVANIA	F	F	++	F
LEADING RIDGE	PENNSYLVANIA		+		
MILFORD	PENNSYLVANIA	.	.	F	F
PENN STATE	PENNSYLVANIA	.	.	F	
PENN STATE	PENNSYLVANIA	.	.	F	F
CLEMSON	SOUTH CAROLINA				+
SANTEE NATIONAL WI	SOUTH CAROLINA	.	.	.	F

Table 2 (continued)

SULFATE DEPOSITION

STATION	STATE	1981	1982	1983	1984
ELKMONT	TENNESSEE		-	F	-
GILES COUNTY	TENNESSEE	.	.	.	F
HATCHIE NATIONAL W	TENNESSEE	.	.	.	F
WALKER BRANCH	TENNESSEE		+		+
BENNINGTON	VERMONT	F			
UNDERHILL	VERMONT	.	.	.	F
BIG MEADOWS	VIRGINIA	F	F	F	F
BIRDWOOD FARM	VIRGINIA	.	.	.	F
HORTON'S STATION	VIRGINIA	F	F	F	F
LOVES MILL	VIRGINIA	.	.	.	F
BABCOCK STATE PARK	WEST VIRGINIA	.	.	F	
PARSONS	WEST VIRGINIA	++	+		
LAKE DUBAY	WISCONSIN	.	F		
LAKE GENEVA	WISCONSIN	.	.	.	F
SPOONER	WISCONSIN				
TROUT LAKE	WISCONSIN	F			

KEY

. = Data unavailable for site

F = Data from site failed screening criteria

+ = Site value greater than upper 65% confidence limit

++ = Site value greater than upper 95% confidence limit

- = Site value less than lower 65% confidence limit

-- = Site value less than lower 95% confidence limit

blank = Site value within 65% confidence limits

Table 3

SULFATE CONCENTRATION

STATION	STATE	1981	1982	1983	1984
BLACKBELT	ALABAMA	.	.	F	
CROSSVILLE	ALABAMA	.	.	.	F
BUFFALO RIVER	ARKANSAS	.	F	F	F
CADDC VALLEY	ARKANSAS	.	.	.	
WARREN 2WSW	ARKANSAS	.	F		F
AUSTIN-CARY FOREST	FLORIDA	F	.	.	.
BRADFORD FOREST	FLORIDA				F
CIFANT	FLORIDA	.	.	F	F
EVERGLADES NAT. PA	FLORIDA	F		F	F
QUINCY	FLORIDA	.	.	.	F
VERNA WELL FIELD	FLORIDA	.	.	F	
BELLVILLE	GEORGIA	.	.	F	F
GEORGIA STATION	GEORGIA				
TIFTON, ARS	GEORGIA	.	.	F	F
ARGONNE	ILLINOIS				
BONDVILLE	ILLINOIS			F	
BONDVILLE INTERCOM	ILLINOIS	.	.	F	F
DIXON SPRINGS	ILLINOIS				
NIARC	ILLINOIS	F			
SALEM	ILLINOIS	F			
SOUTHERN ILL U	ILLINOIS				
HUNTINGTON	INDIANA	.	.	F	
INDIANA DUNES	INDIANA	+			
PURDUE U AG FARM	INDIANA	.	F		+
VINCENNES	INDIANA	.	.	.	F
BIG SPRINGS FISH H	IOWA	.	.	.	F
MCNAY RESEARCH STA	IOWA	.	.	.	F
CLARK STATE FISH H	KENTUCKY	.	.	F	F
LAND BETWEEN THE L	KENTUCKY	.	.	.	F
LILLEY CORNETT WOO	KENTUCKY	.	.	F	
PERRYVILLE	KENTUCKY	.	.	F	
IBERIA	LOUISIANA	.	F	F	
N LA HILL FARM	LOUISIANA	.	F	F	F
SOUTHEAST	LOUISIANA	.	.	F	F
ACADIA < 11/81	MAINE	F	.	.	.
ACADIA > 11/81	MAINE	F	F	F	
BRIDGTON	MAINE		F	F	
CARIBOU (A)	MAINE			F	
GREENVILLE STATION	MAINE				-
PRESQUE ISLE	MAINE	.	.	.	F
WHITE ROCK	MARYLAND	.	.	.	F
WYE	MARYLAND	.	.	F	
CADWELL	MASSACHUSETTS	.	F	F	F
NACL	MASSACHUSETTS	F		F	
EAST	MASSACHUSETTS	.			

Table 3 (continued)

SULFATE CONCENTRATION

STATION	STATE	1981	1982	1983	1984
CHASSELL	MICHIGAN	.	.	F	
DOUGLAS LAKE	MICHIGAN	F			F
HOUGHTON	MICHIGAN	F	F	F	.
ISLE ROYAL PARK	MICHIGAN	F	F	F	F
KELLOGG	MICHIGAN				F
RACO	MICHIGAN	.	.	.	F
WELLSTON	MICHIGAN	F	F		
FERNBERG	MINNESOTA	F			F
MARCELL	MINNESOTA	-			F
CLINTON	MISSISSIPPI	.	.	.	F
COFFEEVILLE	MISSISSIPPI	.	.	.	F
MERIDIAN	MISSISSIPPI				
ASHLAND	MISSOURI	F			
UNIVERSITY FOREST	MISSOURI	F			-
HUBBARD BROOK	NEW HAMPSHIRE				
PRINCETON	NEW JERSEY	F	.	.	.
WASHINGTON XING	NEW JERSEY	F	F	F	
AURORA	NEW YORK	+	+		+
BENNETT BRIDGE	NEW YORK	F	F		
BISCUIT BROOK	NEW YORK	.	.	F	F
CHAUTAUQUA	NEW YORK				
HUNTINGTON	NEW YORK	F			-
JASPER	NEW YORK	F	-		F
KNOBIT	NEW YORK				F
STILWELL LAKE	NEW YORK				F
WEST POINT	NEW YORK	.	.	F	
WHITEFACE	NEW YORK	.	.	.	F
CLINTON STATION	NORTH CAROLINA		F		
COWEETA	NORTH CAROLINA	-	-	F	F
FINLEY (A)	NORTH CAROLINA				
JORDAN CREEK	NORTH CAROLINA	.	.	F	F
LEWISTON	NORTH CAROLINA				
PIEDMONT STATION	NORTH CAROLINA		+		
R TRIANGLE INST	NORTH CAROLINA			.	.
R TRIANGLE PARK	NORTH CAROLINA			F	.
CALDWELL	OHIO	++			+
DELAWARE	OHIO				
OXFORD	OHIO	.	.	.	F
WOOSTER	OHIO				
KANE	PENNSYLVANIA	F	F		F
LEADING RIDGE	PENNSYLVANIA		+		
MILFORD	PENNSYLVANIA	.	.	F	F
PENN STATE	PENNSYLVANIA	.	.	F	
PENN STATE	PENNSYLVANIA	.	.	F	F
CLEMSON	SOUTH CAROLINA	+			+
SANTEE NATIONAL WI	SOUTH CAROLINA	.	.	.	F
ELKMONT	TENNESSEE	-	-	F	-
GILES COUNTY	TENNESSEE	.	.	.	F

Table 3 (continued)

SULFATE CONCENTRATION

STATION	STATE	1981	1982	1983	1984
HATCHIE NATIONAL W	TENNESSEE	.	.	.	F
WALKER BRANCH	TENNESSEE	+	+		
BENNINGTON	VERMONT	F			
UNDERHILL	VERMONT	.	.	.	F
BIG MEADOWS	VIRGINIA	F	F	F	F
BIRDWOOD FARM	VIRGINIA	.	.	.	F
HORTON'S STATION	VIRGINIA	F	F	F	F
LOVES MILL	VIRGINIA	.	.	.	F
BABCOCK STATE PARK	WEST VIRGINIA	.	.	F	
PARSONS	WEST VIRGINIA				
LAKE DUBAY	WISCONSIN	.	F		
LAKE GENEVA	WISCONSIN	.	.	.	F
SPOONER	WISCONSIN				
TROUT LAKE	WISCONSIN	F			

KEY

. = Data unavailable for site

F = Data from site failed screening criteria

+ = Site value greater than upper 65% confidence limit

++ = Site value greater than upper 95% confidence limit

- = Site value less than lower 65% confidence limit

-- = Site value less than lower 95% confidence limit

blank = Site value within 65% confidence limits

NITRATE DEPOSITION

STATION	STATE	1981	1982	1983	1984
BLACKBELT	ALABAMA	.	.	F	
CROSSVILLE	ALABAMA	.	.	.	F
BUFFALO RIVER	ARKANSAS	.	F	F	F
CADDO VALLEY	ARKANSAS	.	.	.	+
WARREN 2WSW	ARKANSAS	.	F		F
AUSTIN-CARY FOREST	FLORIDA	F	.	.	.
BRADFORD FOREST	FLORIDA				F
CIFANT	FLORIDA	.	.	F	F
EVERGLADES NAT. PA	FLORIDA	F		F	F
QUINCY	FLORIDA	.	.	.	F
VERNA WELL FIELD	FLORIDA	.	.	F	
BELLVILLE	GEORGIA	.	.	F	F
GEORGIA STATION	GEORGIA				-
TIFTON, ARS	GEORGIA	.	.	F	F
ARGONNE	ILLINOIS	-		++	+
BONDVILLE	ILLINOIS			F	
BONDVILLE INTERCOM	ILLINOIS	.	.	F	F
DIXON SPRINGS	ILLINOIS				
NIARC	ILLINOIS	F			
SALEM	ILLINOIS	F			
SOUTHERN ILL U	ILLINOIS				
HUNTINGTON	INDIANA	.	.	F	
INDIANA DUNES	INDIANA	++			-
PURDUE U AG FARM	INDIANA	.	F		+
VINCENNES	INDIANA	.	.	.	F
BIG SPRINGS FISH H	IOWA	.	.	.	F
MCNAY RESEARCH STA	IOWA	.	.	.	F
CLARK STATE FISH H	KENTUCKY	.	.	F	F
LAND BETWEEN THE L	KENTUCKY	.	.	.	F
LILLEY CORNETT WOO	KENTUCKY	.	.	F	
PERRYVILLE	KENTUCKY	.	.	F	
IBERIA	LOUISIANA	.	F	F	
N LA HILL FARM	LOUISIANA	.	F	F	F
SOUTHEAST	LOUISIANA	.	.	F	F
ACADIA < 11/81	MAINE	F	.	.	.
ACADIA > 11/81	MAINE	F	F	F	
BRIDGTON	MAINE		F	F	-
CARIBOU (A)	MAINE			F	-
GREENVILLE STATION	MAINE			-	
PRESQUE ISLE	MAINE	.	.	.	F
WHITE ROCK	MARYLAND	.	.	.	F
WYE	MARYLAND	.	.	F	
CADWELL	MASSACHUSETTS	.	F	F	F
NACL	MASSACHUSETTS	F		F	
EAST	MASSACHUSETTS	.		-	

NITRATE DEPOSITION

STATION	STATE	1981	1982	1983	1984
CHASSELL	MICHIGAN	.	.	F	
DOUGLAS LAKE	MICHIGAN	F			F
HOUGHTON	MICHIGAN	F	F	F	.
ISLE ROYAL PARK	MICHIGAN	F	F	F	F
KELLOGG	MICHIGAN			+	F
RACO	MICHIGAN	.	.	.	F
WELLSTON	MICHIGAN	F	F		++
FERNBERG	MINNESOTA	F			F
MARCELL	MINNESOTA				F
CLINTON	MISSISSIPPI	.	.	.	F
COFFEEVILLE	MISSISSIPPI	.	.	.	F
MERIDIAN	MISSISSIPPI				
ASHLAND	MISSOURI	F			
UNIVERSITY FOREST	MISSOURI	F			
HUBBARD BROOK	NEW HAMPSHIRE	+			+
PRINCETON	NEW JERSEY	F	.	.	.
WASHINGTON XING	NEW JERSEY	F	F	F	
AURORA	NEW YORK			-	-
BENNETT BRIDGE	NEW YORK	F	F	++	++
BISCUIT BROOK	NEW YORK	.	.	F	F
CHAUTAUQUA	NEW YORK				
HUNTINGTON	NEW YORK	F			--
JASPER	NEW YORK	F	-	--	F
KNOBIT	NEW YORK			.	F
STILWELL LAKE	NEW YORK			+	F
WEST POINT	NEW YORK	.	.	F	
WHITEFACE	NEW YORK	.	.	.	F
CLINTON STATION	NORTH CAROLINA		F		
COWEETA	NORTH CAROLINA			F	F
FINLEY (A)	NORTH CAROLINA				
JORDAN CREEK	NORTH CAROLINA	.	.	F	F
LEWISTON	NORTH CAROLINA				
PIEDMONT STATION	NORTH CAROLINA				
R TRIANGLE INST	NORTH CAROLINA			.	.
R TRIANGLE PARK	NORTH CAROLINA			F	.
CALDWELL	OHIO				
DELAWARE	OHIO				
OXFORD	OHIO	.	.	.	F
WOOSTER	OHIO				
KANE	PENNSYLVANIA	F	F		F
LEADING RIDGE	PENNSYLVANIA		+		+
MILFORD	PENNSYLVANIA	.	.	F	F
PENN STATE	PENNSYLVANIA	.	.	F	
PENN STATE	PENNSYLVANIA	.	.	F	F
CLEMSON	SOUTH CAROLINA				+
SANTEE NATIONAL WI	SOUTH CAROLINA	.	.	.	F

NITRATE DEPOSITION

STATION	STATE	1981	1982	1983	1984
ELKMONT	TENNESSEE			F	
GILES COUNTY	TENNESSEE	.	.	.	F
HATCHIE NATIONAL W	TENNESSEE	.	.	.	F
WALKER BRANCH	TENNESSEE				
BENNINGTON	VERMONT	F			
UNDERHILL	VERMONT	.	.	.	F
BIG MEADOWS	VIRGINIA	F	F	F	F
BIRDWOOD FARM	VIRGINIA	.	.	.	F
HORTON'S STATION	VIRGINIA	F	F	F	F
LOVES MILL	VIRGINIA	.	.	.	F
BABCOCK STATE PARK	WEST VIRGINIA	.	.	F	
PARSONS	WEST VIRGINIA	++			
LAKE DUBAY	WISCONSIN	.	F		
LAKE GENEVA	WISCONSIN	.	.	.	F
SPOONER	WISCONSIN				
TROUT LAKE	WISCONSIN	F			

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blank = Site value within 65% confidence limits

Table 5

NITRATE CONCENTRATION

STATION	STATE	1981	1982	1983	1984
BLACKBELT	ALABAMA	.	.	F	
CROSSVILLE	ALABAMA	.	.	.	F
BUFFALO RIVER	ARKANSAS	.	F	F	F
CADDO VALLEY	ARKANSAS	.	.	.	
WARREN 2WSW	ARKANSAS	.	F		F
AUSTIN-CARY FOREST	FLORIDA	F	.	.	.
BRADFORD FOREST	FLORIDA				F
CIFANT	FLORIDA	.	.	F	F
EVERGLADES NAT. PA	FLORIDA	F		F	F
QUINCY	FLORIDA	.	.	.	F
VERNA WELL FIELD	FLORIDA	.	.	F	
BELLVILLE	GEORGIA	.	.	F	F
GEORGIA STATION	GEORGIA				
TIFTON, ARS	GEORGIA	.	.	F	F
ARGONNE	ILLINOIS				+
BONDVILLE	ILLINOIS			F	
BONDVILLE INTERCOM	ILLINOIS	.	.	F	F
DIXON SPRINGS	ILLINOIS				
NIARC	ILLINOIS	F			-
SALEM	ILLINOIS	F			
SOUTHERN ILL U	ILLINOIS				
HUNTINGTON	INDIANA	.	.	F	
INDIANA DUNES	INDIANA	+			
PURDUE U AG FARM	INDIANA	.	F		
VINCENNES	INDIANA	.	.	.	F
BIG SPRINGS FISH H	IOWA	.	.	.	F
MCNAY RESEARCH STA	IOWA	.	.	.	F
CLARK STATE FISH H	KENTUCKY	.	.	F	F
LAND BETWEEN THE L	KENTUCKY	.	.	.	F
LILLEY CORNETT WOO	KENTUCKY	.	.	F	
PERRYVILLE	KENTUCKY	.	.	F	
IBERIA	LOUISIANA	.	F	F	
N LA HILL FARM	LOUISIANA	.	F	F	F
SOUTHEAST	LOUISIANA	.	.	F	F
ACADIA < 11/81	MAINE	F	.	.	.
ACADIA > 11/81	MAINE	F	F	F	
BRIDGTON	MAINE		F	F	
CARIBOU (A)	MAINE			F	
GREENVILLE STATION	MAINE				-
PRESQUE ISLE	MAINE	.	.	.	F
WHITE ROCK	MARYLAND	.	.	.	F
WYE	MARYLAND	.	.	F	
CADWELL	MASSACHUSETTS	.	F	F	F
NACL	MASSACHUSETTS	F		F	
EAST	MASSACHUSETTS	.			

NITRATE CONCENTRATION

STATION	STATE	1981	1982	1983	1984
CHASSELL	MICHIGAN	.	.	F	
DOUGLAS LAKE	MICHIGAN	F			F
HOUGHTON	MICHIGAN	F	F	F	.
ISLE ROYAL PARK	MICHIGAN	F	F	F	F
KELLOGG	MICHIGAN			+	F
RACO	MICHIGAN	.	.	.	F
WELLSTON	MICHIGAN	F	F		
FERNBERG	MINNESOTA	F		-	F
MARCELL	MINNESOTA				F
CLINTON	MISSISSIPPI	.	.	.	F
COFFEEVILLE	MISSISSIPPI	.	.	.	F
MERIDIAN	MISSISSIPPI				
ASHLAND	MISSOURI	F			
UNIVERSITY FOREST	MISSOURI	F			
HUBBARD BROOK	NEW HAMPSHIRE				
PRINCETON	NEW JERSEY	F	.	.	.
WASHINGTON XING	NEW JERSEY	F	F	F	
AURORA	NEW YORK		+		
BENNETT BRIDGE	NEW YORK	F	F	+	
BISCUIT BROOK	NEW YORK	.	.	F	F
CHAUTAUQUA	NEW YORK				
HUNTINGTON	NEW YORK	F			
JASPER	NEW YORK	F			F
KNOBIT	NEW YORK				F
STILWELL LAKE	NEW YORK				F
WEST POINT	NEW YORK	.	.	F	
WHITEFACE	NEW YORK	.	.	.	F
CLINTON STATION	NORTH CAROLINA		F		
COWEETA	NORTH CAROLINA			F	F
FINLEY (A)	NORTH CAROLINA				
JORDAN CREEK	NORTH CAROLINA	.	.	F	F
LEWISTON	NORTH CAROLINA				
PIEDMONT STATION	NORTH CAROLINA				
R TRIANGLE INST	NORTH CAROLINA			.	.
R TRIANGLE PARK	NORTH CAROLINA			F	.
CALDWELL	OHIO				
DELAWARE	OHIO				
OXFORD	OHIO	.	.	.	F
WOOSTER	OHIO				
KANE	PENNSYLVANIA	F	F		F
LEADING RIDGE	PENNSYLVANIA		+		
MILFORD	PENNSYLVANIA	.	.	F	F
PENN STATE	PENNSYLVANIA	.	.	F	
PENN STATE	PENNSYLVANIA	.	.	F	F
CLEMSON	SOUTH CAROLINA				
SANTEE NATIONAL WI	SOUTH CAROLINA	.	.	.	F

NITRATE CONCENTRATION

STATION	STATE	1981	1982	1983	1984
ELKMONT	TENNESSEE			F	
GILES COUNTY	TENNESSEE	.	.	.	F
HATCHIE NATIONAL W	TENNESSEE	.	.	.	F
WALKER BRANCH	TENNESSEE				
BENNINGTON	VERMONT	F			
UNDERHILL	VERMONT	.	.	.	F
BIG MEADOWS	VIRGINIA	F	F	F	F
BIRDWOOD FARM	VIRGINIA	.	.	.	F
HORTON'S STATION	VIRGINIA	F	F	F	F
LOVES MILL	VIRGINIA	.	.	.	F
BABCOCK STATE PARK	WEST VIRGINIA	.	.	F	
PARSONS	WEST VIRGINIA				
LAKE DUBAY	WISCONSIN	.	F	+	
LAKE GENEVA	WISCONSIN	.	.	.	F
SPOONER	WISCONSIN				
TROUT LAKE	WISCONSIN	F			

KEY

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F = Data from site failed screening criteria
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- = Site value less than lower 65% confidence limit
-- = Site value less than lower 95% confidence limit
blank = Site value within 65% confidence limits

Table 6

HYDROGEN ION DEPOSITION

STATION	STATE	1981	1982	1983	1984
BLACKBELT	ALABAMA	.	.	F	
CROSSVILLE	ALABAMA	.	.	.	F
BUFFALO RIVER	ARKANSAS	.	F	F	F
CADDO VALLEY	ARKANSAS	.	.	.	
WARREN 2WSW	ARKANSAS	.	F		F
AUSTIN-CARY FOREST	FLORIDA	F	.	.	.
BRADFORD FOREST	FLORIDA				F
CIFANT	FLORIDA	.	.	F	F
EVERGLADES NAT. PA	FLORIDA	F		F	F
QUINCY	FLORIDA	.	.	.	F
VERNA WELL FIELD	FLORIDA	.	.	F	
BELLVILLE	GEORGIA	.	.	F	F
GEORGIA STATION	GEORGIA				
TIFTON, ARS	GEORGIA	.	.	F	F
ARGONNE	ILLINOIS		+		
BONDVILLE	ILLINOIS			F	
BONDVILLE INTERCOM	ILLINOIS	.	.	F	F
DIXON SPRINGS	ILLINOIS				
NIARC	ILLINOIS	F	-		
SALEM	ILLINOIS	F			
SOUTHERN ILL U	ILLINOIS				
HUNTINGTON	INDIANA	.	.	F	
INDIANA DUNES	INDIANA				
PURDUE U AG FARM	INDIANA	.	F		
VINCENNES	INDIANA	.	.	.	F
BIG SPRINGS FISH H	IOWA	.	.	.	F
MCNAY RESEARCH STA	IOWA	.	.	.	F
CLARK STATE FISH H	KENTUCKY	.	.	F	F
LAND BETWEEN THE L	KENTUCKY	.	.	.	F
LILLEY CORNETT WOO	KENTUCKY	.	.	F	
PERRYVILLE	KENTUCKY	.	.	F	
IBERIA	LOUISIANA	.	F	F	
N LA HILL FARM	LOUISIANA	.	F	F	F
SOUTHEAST	LOUISIANA	.	.	F	F
ACADIA < 11/81	MAINE	F	.	.	.
ACADIA > 11/81	MAINE	F	F	F	
BRIDGTON	MAINE		F	F	
CARIBOU (A)	MAINE			F	
GREENVILLE STATION	MAINE	-			
PRESQUE ISLE	MAINE	.	.	.	F
WHITE ROCK	MARYLAND	.	.	.	F
WYE	MARYLAND	.	.	F	
CADWELL	MASSACHUSETTS	.	F	F	F
NACL	MASSACHUSETTS	F		F	
EAST	MASSACHUSETTS	.			

2

Table 6 (continued)

HYDROGEN ION DEPOSITION

STATION	STATE	1981	1982	1983	1984
CHASSELL	MICHIGAN	.	.	F	
DOUGLAS LAKE	MICHIGAN	F			F
HOUGHTON	MICHIGAN	F	F	F	.
ISLE ROYAL PARK	MICHIGAN	F	F	F	F
KELLOGG	MICHIGAN				F
RACO	MICHIGAN	.	.	.	F
WELLSTON	MICHIGAN	F	F		+
FERNBERG	MINNESOTA	F			F
MARCELL	MINNESOTA				F
CLINTON	MISSISSIPPI	.	.	.	F
COFFEEVILLE	MISSISSIPPI	.	.	.	F
MERIDIAN	MISSISSIPPI				
ASHLAND	MISSOURI	F			
UNIVERSITY FOREST	MISSOURI	F			
HUBBARD BROOK	NEW HAMPSHIRE	+			
PRINCETON	NEW JERSEY	F	.	.	.
WASHINGTON XING	NEW JERSEY	F	F	F	
AURORA	NEW YORK				
BENNETT BRIDGE	NEW YORK	F	F		
BISCUIT BROOK	NEW YORK	.	.	F	F
CHAUTAUQUA	NEW YORK				
HUNTINGTON	NEW YORK	F			
JASPER	NEW YORK	F	-		F
KNOBIT	NEW YORK				F
STILWELL LAKE	NEW YORK				F
WEST POINT	NEW YORK	.	.	F	
WHITEFACE	NEW YORK	.	.	.	F
CLINTON STATION	NORTH CAROLINA		F		
COWEETA	NORTH CAROLINA			F	F
FINLEY (A)	NORTH CAROLINA				
JORDAN CREEK	NORTH CAROLINA	.	.	F	F
LEWISTON	NORTH CAROLINA				
PIEDMONT STATION	NORTH CAROLINA				
R TRIANGLE INST	NORTH CAROLINA		+	.	.
R TRIANGLE PARK	NORTH CAROLINA			F	.
CALDWELL	OHIO	+			
DELAWARE	OHIO				
OXFORD	OHIO	.	.	.	F
WOOSTER	OHIO				
KANE	PENNSYLVANIA	F	F		F
LEADING RIDGE	PENNSYLVANIA		+		
MILFORD	PENNSYLVANIA	.	.	F	F
PENN STATE	PENNSYLVANIA	.	.	F	+
PENN STATE	PENNSYLVANIA	.	.	F	F
CLEMSON	SOUTH CAROLINA				+
SANTEE NATIONAL WI	SOUTH CAROLINA	.	.	.	F

Table 6 (continued)

HYDROGEN ION DEPOSITION

STATION	STATE	1981	1982	1983	1984
ELKMONT	TENNESSEE		-	F	
GILES COUNTY	TENNESSEE	.	.	.	F
HATCHIE NATIONAL W	TENNESSEE	.	.	.	F
WALKER BRANCH	TENNESSEE		++		
BENNINGTON	VERMONT	F			
UNDERHILL	VERMONT	.	.	.	F
BIG MEADOWS	VIRGINIA	F	F	F	F
BIRDWOOD FARM	VIRGINIA	.	.	.	F
HORTON'S STATION	VIRGINIA	F	F	F	F
LOVES MILL	VIRGINIA	.	.	.	F
BABCOCK STATE PARK	WEST VIRGINIA	.	.	F	
PARSONS	WEST VIRGINIA	+	+		
LAKE DUBAY	WISCONSIN	.	F		
LAKE GENEVA	WISCONSIN	.	.	.	F
SPOONER	WISCONSIN				
TROUT LAKE	WISCONSIN	F			

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- = Site value less than lower 65% confidence limit

-- = Site value less than lower 95% confidence limit

blank = Site value within 65% confidence limits

Table 7

HYDROGEN ION CONCENTRATION

STATION	STATE	1981	1982	1983	1984
BLACKBELT	ALABAMA	.	.	F	
CROSSVILLE	ALABAMA	.	.	.	F
BUFFALO RIVER	ARKANSAS	.	F	F	F
CADDO VALLEY	ARKANSAS	.	.	.	
WARREN 2WSW	ARKANSAS	.	F		F
AUSTIN-CARY FOREST	FLORIDA	F	.	.	.
BRADFORD FOREST	FLORIDA				F
CIFANT	FLORIDA	.	.	F	F
EVERGLADES NAT. PA	FLORIDA	F		F	F
QUINCY	FLORIDA	.	.	.	F
VERNA WELL FIELD	FLORIDA	.	.	F	
BELLVILLE	GEORGIA	.	.	F	F
GEORGIA STATION	GEORGIA				
TIFTON, ARS	GEORGIA	.	.	F	F
ARGONNE	ILLINOIS		+		
BONDVILLE	ILLINOIS		+	F	
BONDVILLE INTERCOM	ILLINOIS	.	.	F	F
DIXON SPRINGS	ILLINOIS		-		
NIARC	ILLINOIS	F			
SALEM	ILLINOIS	F			
SOUTHERN ILL U	ILLINOIS				
HUNTINGTON	INDIANA	.	.	F	
INDIANA DUNES	INDIANA				
PURDUE U AG FARM	INDIANA	.	F		
VINCENNES	INDIANA	.	.	.	F
BIG SPRINGS FISH H	IOWA	.	.	.	F
MCNAY RESEARCH STA	IOWA	.	.	.	F
CLARK STATE FISH H	KENTUCKY	.	.	F	F
LAND BETWEEN THE L	KENTUCKY	.	.	.	F
LILLEY CORNETT WOO	KENTUCKY	.	.	F	
PERRYVILLE	KENTUCKY	.	.	F	
IBERIA	LOUISIANA	.	F	F	
N LA HILL FARM	LOUISIANA	.	F	F	F
SOUTHEAST	LOUISIANA	.	.	F	F
ACADIA < 11/81	MAINE	F	.	.	.
ACADIA > 11/81	MAINE	F	F	F	
BRIDGTON	MAINE		F	F	
CARIBOU (A)	MAINE			F	
GREENVILLE STATION	MAINE	-	-		
PRESQUE ISLE	MAINE	.	.	.	F
WHITE ROCK	MARYLAND	.	.	.	F
WYE	MARYLAND	.	.	F	
CADWELL	MASSACHUSETTS	.	F	F	F
NACL	MASSACHUSETTS	F		F	-
EAST	MASSACHUSETTS	.			

HYDROGEN ION CONCENTRATION

STATION	STATE	1981	1982	1983	1984
CHASSELL	MICHIGAN	.	.	F	
DOUGLAS LAKE	MICHIGAN	F			F
HOUGHTON	MICHIGAN	F	F	F	.
ISLE ROYAL PARK	MICHIGAN	F	F	F	F
KELLOGG	MICHIGAN				F
RACO	MICHIGAN	.	.	.	F
WELLSTON	MICHIGAN	F	F		+
FERNBERG	MINNESOTA	F			F
MARCELL	MINNESOTA				F
CLINTON	MISSISSIPPI	.	.	.	F
COFFEEVILLE	MISSISSIPPI	.	.	.	F
MERIDIAN	MISSISSIPPI				
ASHLAND	MISSOURI	F			
UNIVERSITY FOREST	MISSOURI	F			-
HUBBARD BROOK	NEW HAMPSHIRE				
PRINCETON	NEW JERSEY	F	.	.	.
WASHINGTON XING	NEW JERSEY	F	F	F	
AURORA	NEW YORK	+	+		
BENNETT BRIDGE	NEW YORK	F	F		
BISCUIT BROOK	NEW YORK	.	.	F	F
CHAUTAUQUA	NEW YORK				
HUNTINGTON	NEW YORK	F			-
JASPER	NEW YORK	F	-		F
KNOBIT	NEW YORK				F
STILWELL LAKE	NEW YORK				F
WEST POINT	NEW YORK	.	.	F	
WHITEFACE	NEW YORK	.	.	.	F
CLINTON STATION	NORTH CAROLINA		F		
COWEETA	NORTH CAROLINA	-	-	F	F
FINLEY (A)	NORTH CAROLINA				
JORDAN CREEK	NORTH CAROLINA	.	.	F	F
LEWISTON	NORTH CAROLINA				
PIEDMONT STATION	NORTH CAROLINA		+		
R TRIANGLE INST	NORTH CAROLINA	-		.	.
R TRIANGLE PARK	NORTH CAROLINA			F	.
CALDWELL	OHIO	+	+		+
DELAWARE	OHIO				
OXFORD	OHIO	.	.	.	F
WOOSTER	OHIO				
KANE	PENNSYLVANIA	F	F		F
LEADING RIDGE	PENNSYLVANIA		+		
MILFORD	PENNSYLVANIA	.	.	F	F
PENN STATE	PENNSYLVANIA	.	.	F	+
PENN STATE	PENNSYLVANIA	.	.	F	F
CLEMSON	SOUTH CAROLINA				+
SANTEE NATIONAL WI	SOUTH CAROLINA	.	.	.	F

HYDROGEN ION CONCENTRATION

STATION	STATE	1981	1982	1983	1984
ELKMONT	TENNESSEE		-	F	-
GILES COUNTY	TENNESSEE	.	.	.	F
HATCHIE NATIONAL W	TENNESSEE	.	.	.	F
WALKER BRANCH	TENNESSEE	+	++		
BENNINGTON	VERMONT	F			
UNDERHILL	VERMONT	.	.	.	F
BIG MEADOWS	VIRGINIA	F	F	F	F
BIRDWOOD FARM	VIRGINIA	.	.	.	F
HORTON'S STATION	VIRGINIA	F	F	-	F
LOVES MILL	VIRGINIA	.	.	.	F
BABCOCK STATE PARK	WEST VIRGINIA	.	.	F	
PARSONS	WEST VIRGINIA				
LAKE DUBAY	WISCONSIN	.	F		
LAKE GENEVA	WISCONSIN	.	.	.	F
SPOONER	WISCONSIN				
TROUT LAKE	WISCONSIN	F			

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blank = Site value within 65% confidence limits

Table 8

PROPORTION OF YEARS IN WHICH SITE DEVIATES FROM 65% OR 95% CONFIDENCE LIMITS

		SULFATE		NITRATE		HYDROGEN ION	
STATION	STATE	DEP.	CONC.	DEP.	CONC.	DEP.	CONC.
BLACKBELT	ALABAMA	0/1	0/1	0/1	0/1	0/1	0/1
CADDO VALLEY	ARKANSAS	1/1	0/1	1/1	0/1	0/1	0/1
WARREN 2WSW	ARKANSAS	0/1	0/1	0/1	0/1	0/1	0/1
BRADFORD FOREST	FLORIDA	0/3	0/3	0/3	0/3	0/3	0/3
EVERGLADES NAT. PA	FLORIDA	1/1	0/1	0/1	0/1	0/3	0/3
VERNA WELL FIELD	FLORIDA	0/1	0/1	0/1	0/1	0/1	0/1
GEORGIA STATION	GEORGIA	1/4	0/4	1/4	0/4	0/4	0/4
*ARGONNE	ILLINOIS	4/4	0/4	3/4	1/4	1/4	1/4
BONDVILLE	ILLINOIS	1/3	0/3	0/3	0/3	0/3	1/3
DIXON SPRINGS	ILLINOIS	3/4	0/4	0/4	0/4	0/4	1/4
NIARC	ILLINOIS	1/4	0/4	0/4	1/4	0/4	0/4
SALEM	ILLINOIS	0/2	0/2	0/2	0/2	0/2	0/2
SOUTHERN ILL U	ILLINOIS	0/4	0/4	0/4	0/4	0/4	0/4
HUNTINGTON	INDIANA	0/1	0/1	0/1	0/1	0/1	0/1
INDIANA DUNES	INDIANA	1/4	1/4	2/4	1/4	1/4	0/4
PURDUE U AG FARM	INDIANA	1/2	1/2	0/2	0/2	0/2	0/2
LILLEY CORNETT WOO	KENTUCKY	0/1	0/1	0/1	0/1	0/1	0/1
PERRYVILLE	KENTUCKY	1/1	0/1	0/1	0/1	0/1	0/1
IBERIA	LOUISIANA	0/1	0/1	0/1	0/1	0/1	0/1
ACADIA > 11/81	MAINE	0/1	0/1	0/1	0/1	0/1	0/1
BRIDGTON	MAINE	1/2	0/2	1/2	0/2	0/2	0/2
CARIBOU (A)	MAINE	0/3	0/3	1/3	0/3	0/3	0/3
GREENVILLE STATION	MAINE	1/4	1/4	1/4	1/4	1/4	2/4
WYE	MARYLAND	0/1	0/1	0/1	0/1	0/1	0/1
NACL	MASSACHUSETTS	0/2	0/2	0/2	0/2	0/2	1/2
EAST	MASSACHUSETTS	0/3	0/3	1/3	0/3	0/3	0/3
CHASSELL	MICHIGAN	0/1	0/1	0/1	0/1	0/1	0/1
DOUGLAS LAKE	MICHIGAN	0/2	0/2	0/2	0/2	0/2	0/2
KELLOGG	MICHIGAN	1/3	0/3	1/3	1/3	0/3	0/3
WELLSTON	MICHIGAN	0/2	0/2	1/2	0/2	1/2	1/2
FERNBERG	MINNESOTA	0/2	0/2	0/2	1/2	0/2	0/2
MARCELL	MINNESOTA	2/3	1/3	0/3	0/2	0/2	0/2
MERIDIAN	MISSISSIPPI	0/4	0/4	0/4	0/4	0/4	0/4
ASHLAND	MISSOURI	0/3	0/3	0/3	0/3	0/3	0/3
UNIVERSITY FOREST	MISSOURI	1/3	1/3	0/3	0/3	0/3	1/3
HUBBARD BROOK	NEW HAMPSHIRE	1/4	0/4	2/4	0/4	1/4	0/4
WASHINGTON XING	NEW JERSEY	0/1	0/1	0/1	0/1	0/1	0/1
*AURORA	NEW YORK	0/4	3/4	2/4	1/4	0/4	2/4
BENNETT BRIDGE	NEW YORK	2/2	0/2	2/2	1/2	0/2	0/2
CHAUTAUQUA	NEW YORK	0/4	0/4	0/4	0/4	0/4	1/4
HUNTINGTON	NEW YORK	1/3	1/3	1/3	0/3	0/3	1/3
*JASPER	NEW YORK	2/2	1/2	2/2	0/2	1/2	1/2
KNOBIT	NEW YORK	1/3	0/3	0/3	0/3	0/3	0/3
STILWELL LAKE	NEW YORK	1/3	0/3	1/3	0/3	0/3	0/3
WEST POINT	NEW YORK	0/1	0/1	0/1	0/1	0/1	0/1
CLINTON STATION	NORTH CAROLINA	0/3	0/3	0/3	0/3	0/3	0/3

Table 8 (continued)

STATION	STATE	SULFATE DEP.	SULFATE CONC.	NITRATE DEP.	NITRATE CONC.	HYDROGEN ION DEP.	HYDROGEN ION CONC.
*COWEETA	NORTH CAROLINA	0/2	2/2	0/2	0/2	0/2	2/2
FINLEY (A)	NORTH CAROLINA	0/3	0/4	0/4	0/4	0/4	0/4
LEWISTON	NORTH CAROLINA	1/4	0/4	0/4	0/4	0/4	0/4
PIEDMONT STATION	NORTH CAROLINA	0/4	1/4	0/4	0/4	0/4	1/4
R TRIANGLE INST	NORTH CAROLINA	0/2	0/2	0/2	0/2	1/2	1/4
R TRIANGLE PARK	NORTH CAROLINA	0/2	0/2	0/2	0/2	0/2	0/2
*CALDWELL	OHIO	1/4	2/4	0/4	0/4	1/4	3/4
DELAWARE	OHIO	2/4	0/4	0/4	0/4	0/4	0/4
WOOSTER	OHIO	0/4	0/4	0/4	0/4	0/4	0/4
KANE	PENNSYLVANIA	1/1	0/1	0/1	0/1	0/1	0/1
LEADING RIDGE	PENNSYLVANIA	1/4	1/4	2/4	1/4	1/4	1/4
PENN STATE	PENNSYLVANIA	0/1	0/1	0/1	0/1	1/1	0/1
CLEMSON	SOUTH CAROLINA	1/4	2/4	1/4	0/4	1/4	1/4
*ELKMONT	TENNESSEE	2/3	3/3	0/3	0/3	1/3	2/3
*WALKER BRANCH	TENNESSEE	2/4	2/4	0/4	0/4	1/4	2/4
BENNINGTON	VERMONT	0/3	0/3	0/3	0/3	0/3	0/3
BABCOCK STATE PARK	WEST VIRGINIA	0/1	0/1	0/1	0/1	0/1	0/1
*PARSONS	WEST VIRGINIA	2/4	0/4	1/4	0/4	2/4	0/4
LAKE DUBAY	WISCONSIN	0/2	0/2	0/2	1/2	0/2	0/2
SPOONER	WISCONSIN	0/4	0/4	0/4	0/4	0/4	0/4
TROUT LAKE	WISCONSIN	0/3	0/3	0/3	0/3	0/3	0/3

* denotes a site which exceeded estimated confidence limits in 50% or more of the monitoring years for more than one component (deposition or concentration)

Table 9

NADP SITES

SULFATE CONCENTRATION

CORRELATIONS BETWEEN WEEKLY DATA

PAIR	DISTANCE	1980	1981	1982	1983	1984
053A 053B	0.00	-0.09	.	.	.	.
162A 257A	3.91	.	0.09	.	.	.
064A 065B	14.09	.	.	.	-0.48	0.42
043B 168A	53.93	.	.	.	.	-0.24
359A 371A	77.17	.	.	.	.	.
073A 379A	78.18	.	.	.	0.06	.
039A 164A	78.81	-0.51	0.08	0.50	0.32	0.32
358A 359A	79.42	.	.	.	.	0.17
052A 053A	84.98	0.23	0.48	0.01	0.19	0.36
052A 053B	84.98	0.78	.	.	.	.
023A 423A	88.18	.	.	.	.	-0.58
031A 351A	88.75	.	.	.	.	-0.23
350A 424A	89.34	.	.	.	.	0.55
041A 063A	91.98	-0.12	0.11	0.07	0.23	-0.01
040A 047A	98.54	0.09	0.23	0.21	0.57	0.23
040A 046A	103.46	-0.35	0.19	-0.06	0.48	0.03
021A 328B	104.23	.	.	.	.	-0.18
055A 058A	105.81	0.26	0.38	-0.11	0.16	0.18
046A 248C	109.39	.	.	.	.	0.10
285A 371A	110.35	.	.	.	.	.
063A 065B	111.35	.	.	.	-0.38	0.10
268A 330A	111.38	.	.	.	.	0.72
056A 058A	112.53	0.18	0.35	0.20	0.56	0.28
053A 360A	112.60	.	.	.	-0.54	0.25
052A 360A	113.54	.	.	.	0.34	0.43
047A 063A	114.84	0.11	0.22	0.34	0.36	0.03
075A 250A	122.94	.	.	.	.	0.15
347A 348A	123.22	.	.	.	0.93	0.28
063A 064A	123.30	-0.18	0.08	-0.20	0.70	0.17
050A 171A	124.79	-0.09	0.24	0.24	.	0.48
051A 360A	126.68	.	.	.	0.60	0.23
285A 358A	131.30	.	.	.	.	0.53
346A 348A	131.66	.	.	.	-0.24	0.02
023A 161A	134.03	0.32	0.31	0.17	0.15	0.26
049A 053A	141.69	-0.00	0.21	0.45	0.33	0.44
049A 053B	141.69	0.08	.	.	.	.
168A 248C	142.61	.	.	.	.	-0.24
055A 056A	142.80	0.00	-0.04	0.17	0.49	0.29
337A 340A	143.59	.	.	.	.	-0.33
046A 168A	144.77	-0.14	0.21	0.19	0.30	0.62
249A 359A	144.95	.	.	.	-0.25	0.72
163A 249A	146.29	.	0.10	-0.06	0.43	0.29
047A 065B	147.56	.	.	.	-0.47	-0.06
076A 283A	151.29	.	.	-0.10	0.33	0.48
041A 047A	152.49	-0.58	-0.19	0.26	0.34	0.18
034A 166A	152.61	-0.14	0.62	0.15	0.05	0.21
023A 253A	155.57	.	.	-0.00	0.51	-0.07
057B 343A	155.60	.	.	.	.	-0.19
049A 052A	156.06	0.30	0.22	0.17	0.19	0.12
250A 424A	156.16	.	.	.	.	0.79
043B 248C	157.89	.	.	.	.	0.38

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NADP SITES

SULFATE CONCENTRATION

CORRELATIONS BETWEEN WEEKLY DATA

PAIR	DISTANCE	1980	1981	1982	1983	1984
064A 424A	158.32	.	.	.	.	0.39
047A 064A	161.12	-0.04	0.09	0.09	0.75	-0.22
030A 162A	161.30	0.34	-0.03	.	.	.
020A 161A	161.80	-0.11	0.12	0.59	0.01	0.39
155D 425A	161.95	.	.	.	.	0.03
030A 257A	163.22	.	-0.44	0.10	-0.07	-0.11
242B 349A	163.59	.	.	.	.	-0.11
075A 379A	164.11	.	.	.	0.06	.
039A 249A	164.41	.	-0.03	-0.09	0.45	0.08
339A 340A	165.24	.	.	.	-0.12	.
249A 277A	165.97	.	.	0.03	0.18	0.19
055A 057B	166.01	.	.	.	.	-0.29
171A 347A	167.32	.	.	.	.	0.71
031A 033A	170.54	-0.01	0.39	0.37	0.17	0.04
065B 424A	170.99	.	.	.	.	0.15
032A 343A	171.23	.	.	.	0.23	0.66
076A 077A	171.25	-0.09	-0.18	0.09	-0.14	0.45
030A 164A	171.89	-0.40	0.23	0.17	0.34	0.15
043B 249A	174.11	.	.	.	.	-0.24
039A 277A	174.35	.	.	-0.08	0.22	-0.07
051A 053A	174.49	0.29	0.65	0.18	0.27	0.07
051A 053B	174.49	0.31	.	.	.	.
056A 075A	176.17	0.20	0.21	0.25	0.41	0.47
329A 425A	176.24	.	.	.	.	-0.18
039A 043B	176.33	.	.	.	.	-0.02
275A 349A	177.01	.	.	.	0.36	0.54
051A 073A	178.64	-0.14	0.11	0.28	0.49	0.22
030A 436A	178.80	.	.	.	.	0.10
360A 429A	178.94	.	.	.	.	-0.17
249A 358A	181.14	.	.	.	.	0.24
020A 021A	182.33	0.07	0.12	0.28	-0.05	0.17
346A 347A	183.97	.	.	.	-0.28	0.35
057B 348A	184.10	.	.	.	.	-0.02
285A 359A	185.29	.	.	.	1.00	0.30
285A 350A	188.21	.	.	.	0.38	0.37
043B 046A	189.75	.	.	.	.	-0.30
164A 277A	191.88	.	.	0.16	0.61	-0.07
040A 359A	192.34	.	.	.	-0.02	-0.24
155D 423A	194.36	.	.	.	.	0.94
164A 257A	195.87	.	0.42	0.31	-0.17	0.26
171A 346A	196.19	.	.	.	.	0.19
162A 164A	197.64	0.36	0.06	.	.	.
039A 168A	198.85	0.46	0.88	0.50	0.29	0.24
253A 423A	199.23	.	.	.	.	-0.38

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Table 10

NADP SITES

SULFATE DEPOSITION

CORRELATIONS BETWEEN WEEKLY DATA

PAIR	DISTANCE	1980	1981	1982	1983	1984
053A 053B	0.00	0.56	.	.	.	.
162A 257A	3.91	.	-0.35	.	.	.
064A 065B	14.09	.	.	.	-0.34	0.71
043B 168A	53.93	.	.	.	.	-0.04
359A 371A	77.17	.	.	.	.	.
073A 379A	78.18	.	.	.	0.07	.
039A 164A	78.81	-0.22	0.07	0.17	-0.16	0.16
358A 359A	79.42	.	.	.	.	0.01
052A 053A	84.98	-0.03	0.11	0.07	0.01	0.32
052A 053B	84.98	0.50	.	.	.	.
023A 423A	88.18	.	.	.	.	0.18
031A 351A	88.75	.	.	.	.	-0.03
350A 424A	89.34	.	.	.	.	-0.22
041A 063A	91.98	-0.42	-0.25	0.33	0.03	0.26
040A 047A	95.54	0.46	0.18	-0.17	0.26	-0.14
040A 046A	103.46	-0.13	0.19	0.06	0.19	0.22
021A 328B	104.23	.	.	.	.	0.32
055A 058A	105.81	0.55	0.52	-0.09	-0.06	0.43
046A 248C	109.39	.	.	.	.	-0.15
285A 371A	110.35	.	.	.	.	.
063A 065B	111.35	.	.	.	-0.35	-0.19
268A 330A	111.38	.	.	.	.	-0.07
056A 058A	112.53	0.52	0.31	0.08	-0.06	-0.04
053A 360A	112.60	.	.	.	0.67	0.38
052A 360A	113.54	.	.	.	0.46	0.67
047A 063A	114.84	0.24	-0.04	0.09	0.10	0.14
075A 250A	122.94	.	.	.	.	-0.06
347A 348A	123.22	.	.	.	0.72	0.01
063A 064A	123.30	0.14	0.42	0.07	0.25	-0.15
050A 171A	124.79	-0.17	0.11	0.54	.	0.67
051A 360A	126.68	.	.	.	-0.35	0.11
285A 358A	131.30	.	.	.	.	0.36
346A 348A	131.66	.	.	.	0.38	-0.06
023A 161A	134.03	-0.11	0.02	0.45	-0.21	0.34
049A 053A	141.69	0.14	0.42	0.16	0.36	0.33
049A 053B	141.69	0.62	.	.	.	.
168A 248C	142.61	.	.	.	.	-0.43
055A 056A	142.80	0.21	0.38	0.24	0.68	0.06
337A 340A	143.59	.	.	.	.	0.10
046A 168A	144.77	0.12	0.21	-0.18	-0.14	0.23
249A 359A	144.95	.	.	.	0.26	0.17
168A 249A	146.29	.	-0.15	0.03	0.15	0.63
047A 065B	147.56	.	.	.	-0.27	-0.07
076A 283A	151.29	.	.	-0.26	0.14	0.19
041A 047A	152.49	-0.23	0.21	0.18	0.73	0.03
034A 166A	152.61	-0.87	-0.14	0.04	0.07	0.45
023A 253A	153.57	.	.	0.20	-0.03	0.59
057B 343A	155.60	.	.	.	.	0.27
049A 052A	156.06	0.05	0.57	0.05	-0.10	0.39
250A 424A	156.16	.	.	.	.	0.79
043B 248C	157.89	.	.	.	.	-0.34

NADP SITES

SULFATE DEPOSITION

CORRELATIONS BETWEEN WEEKLY DATA

PAIR	DISTANCE	1980	1981	1982	1983	1984
064A 424A	158.32	.	.	.	.	0.11
047A 064A	161.12	0.30	-0.03	-0.00	0.64	-0.02
030A 162A	161.30	-0.63	-0.11	.	.	.
020A 161A	161.80	0.16	0.11	0.56	0.58	0.20
155D 425A	161.95	.	.	.	.	0.26
030A 257A	163.22	.	-0.09	-0.12	-0.03	0.04
242B 349A	163.59	.	.	.	.	0.61
075A 379A	164.11	.	.	.	0.28	.
039A 249A	164.41	.	-0.09	0.11	0.06	0.52
339A 340A	165.24	.	.	.	-0.52	.
249A 277A	165.97	.	.	-0.18	0.11	-0.08
025A 057B	166.01	.	.	.	.	0.25
171A 347A	167.32	.	.	.	.	0.46
031A 033A	170.54	0.09	0.13	0.09	0.11	0.08
065B 424A	170.99	.	.	.	.	-0.16
032A 343A	171.23	.	.	.	0.65	-0.12
076A 077A	171.25	0.35	-0.03	-0.09	0.01	0.36
030A 164A	171.99	-0.28	0.16	0.43	0.16	0.32
043B 249A	174.11	.	.	.	.	0.15
039A 277A	174.35	.	.	0.13	-0.17	-0.08
051A 053A	174.49	0.20	0.06	0.20	0.24	-0.09
051A 053B	174.49	0.17	.	.	.	.
056A 075A	176.17	0.11	0.67	-0.03	-0.09	0.08
329A 425A	176.24	.	.	.	.	0.03
039A 043B	176.33	.	.	.	.	-0.27
275A 349A	177.01	.	.	.	-0.38	0.29
051A 073A	178.64	-0.09	0.17	0.47	0.49	-0.09
030A 436A	178.80	.	.	.	.	-0.35
360A 429A	178.94	.	.	.	.	-0.99
249A 358A	181.14	.	.	.	.	0.40
020A 021A	182.33	0.05	0.34	0.01	-0.02	0.52
346A 347A	183.97	.	.	.	0.85	-0.10
057B 348A	184.10	.	.	.	.	0.18
285A 359A	185.29	.	.	.	1.00	0.19
285A 350A	188.21	.	.	.	0.11	0.26
043B 046A	189.75	.	.	.	.	-0.27
164A 277A	191.88	.	.	-0.02	0.09	0.04
040A 359A	192.34	.	.	.	0.13	-0.27
155D 423A	194.36	.	.	.	.	0.87
164A 257A	195.87	.	0.06	0.44	-0.17	-0.12
171A 346A	196.19	.	.	.	.	0.04
162A 164A	197.64	0.33	0.04	.	.	.
039A 168A	198.85	0.36	0.35	0.43	0.12	0.21
253A 423A	199.23	.	.	.	.	0.15

Table 11

NADP SITE IDENTIFIERS

ID	STATION	STATE
014A	AUSTIN-CARY FOREST	FLORIDA
015A	BRADFORD FOREST	FLORIDA
016A	EVERGLADES NAT. PA	FLORIDA
017A	GEORGIA STATION	GEORGIA
020A	BONDVILLE	ILLINOIS
020C	BONDVILLE INTERCOM	ILLINOIS
021A	ARGONNE	ILLINOIS
022A	SOUTHERN ILL U	ILLINOIS
023A	DIXON SPRINGS	ILLINOIS
024A	NIARC	ILLINOIS
025A	INDIANA DUNES	INDIANA
026A	ISLE ROYAL PARK	MICHIGAN
028A	ELKMONT	TENNESSEE
030A	GREENVILLE STATION	MAINE
031A	DOUGLAS LAKE	MICHIGAN
032A	KELLOGG	MICHIGAN
033A	WELLSTON	MICHIGAN
034A	MARCELL	MINNESOTA
036A	MERIDIAN	MISSISSIPPI
039A	HUBBARD BROOK	NEW HAMPSHIRE
040A	AURORA	NEW YORK
041A	CHAUTAUQUA	NEW YORK
042A	KNOBIT	NEW YORK
043B	WHITEFACE	NEW YORK
045A	STILWELL LAKE	NEW YORK
046A	BENNETT BRIDGE	NEW YORK
047A	JASPER	NEW YORK
049A	LEWISTON	NORTH CAROLINA
050A	COWEETA	NORTH CAROLINA
051A	PIEDMONT STATION	NORTH CAROLINA
052A	CLINTON STATION	NORTH CAROLINA
053A	FINLEY (A)	NORTH CAROLINA
053B	FINLEY (B)	NORTH CAROLINA
055A	DELAWARE	OHIO
056A	CALDWELL	OHIO
057B	OXFORD	OHIO
058A	WOOSTER	OHIO
063A	KANE	PENNSYLVANIA
064A	LEADING RIDGE	PENNSYLVANIA
065B	PENN STATE	PENNSYLVANIA
065C	PENN STATE	PENNSYLVANIA
066A	CLEMSON	SOUTH CAROLINA
072B	BIRDWOOD FARM	VIRGINIA
073A	HORTON'S STATION	VIRGINIA
075A	PARSONS	WEST VIRGINIA
076A	TROUT LAKE	WISCONSIN
077A	SPOONER	WISCONSIN

Table 11 (continued)

ID	STATION	STATE
155D	GILES COUNTY	TENNESSEE
161A	SALEM	ILLINOIS
162A	ACADIA < 11/81	MAINE
163A	CARIBOU (A)	MAINE
164A	BRIDGTON	MAINE
165A	HOUGHTON	MICHIGAN
166A	FERNBERG	MINNESOTA
167A	PRINCETON	NEW JERSEY
168A	HUNTINGTON	NEW YORK
169A	R TRIANGLE PARK	NORTH CAROLINA
171A	WALKER BRANCH	TENNESSEE
174A	R TRIANGLE INST	NORTH CAROLINA
242B	CLINTON	MISSISSIPPI
248C	UNDERHILL	VERMONT
249A	BENNINGTON	VERMONT
250A	BIG MEADOWS	VIRGINIA
251A	NACL	MASSACHUSETTS
252A	ASHLAND	MISSOURI
253A	UNIVERSITY FOREST	MISSOURI
257A	ACADIA > 11/81	MAINE
258A	CHASSELL	MICHIGAN
268A	WARREN 2WSW	ARKANSAS
269A	BUFFALO RIVER	ARKANSAS
272A	PURDUE U AG FARM	INDIANA
274A	N LA HILL FARM	LOUISIANA
275A	IBERIA	LOUISIANA
276A	CADWELL	MASSACHUSETTS
277A	EAST	MASSACHUSETTS
283A	LAKE DUBAY	WISCONSIN
285A	WASHINGTON XING	NEW JERSEY
328B	LAKE GENEVA	WISCONSIN
329A	BLACKBELT	ALABAMA
330A	CADDO VALLEY	ARKANSAS
336A	CIFANT	FLORIDA
337A	QUINCY	FLORIDA
338A	VERNA WELL FIELD	FLORIDA
339A	BELLVILLE	GEORGIA
340A	TIFTON, ARS	GEORGIA
343A	HUNTINGTON	INDIANA
346A	PERRYVILLE	KENTUCKY
347A	LILLEY CORNETT WOO	KENTUCKY
348A	CLARK STATE FISH H	KENTUCKY
349A	SOUTHEAST	LOUISIANA
350A	WYE	MARYLAND
351A	RACO	MICHIGAN
358A	WEST POINT	NEW YORK
359A	BISCUIT BROOK	NEW YORK
360A	JORDAN CREEK	NORTH CAROLINA
371A	MILFORD	PENNSYLVANIA
379A	BABCOCK STATE PARK	WEST VIRGINIA
412B	LOVES MILL	VIRGINIA
420A	VINCENNES	INDIANA

ID	STATION	STATE
421A	BIG SPRINGS FISH H	IOWA
422A	MCNAY RESEARCH STA	IOWA
423A	LAND BETWEEN THE L	KENTUCKY
424A	WHITE ROCK	MARYLAND
425A	COFFEEVILLE	MISSISSIPPI
429A	SANTEE NATIONAL WI	SOUTH CAROLINA
432A	CROSSVILLE	ALABAMA
435A	HATCHIE NATIONAL W	TENNESSEE
436A	PRESQUE ISLE	MAINE

EXPLANATION OF HEADINGS FOR TABLES IN THE APPENDIX

LONG = longitude of site

LAT = latitude of site

PRED = value predicted for site by kriging data from 10 closest sites

VARIANCE = kriging variance of the estimated value at the site

ACTUAL = actual (measured) annual deposition (g/m^2) or concentration (mg/l)

REP = indicator of regional representativeness

- = site value less than lower 65% confidence limit

-- = site value less than lower 95% confidence limit

+ = site value greater than upper 65% confidence limit

++ = site value

OBS = sequential observation number, not relevant to analysis

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SULFATE DEPOSITION -- 1981

OBS	LONG	LAT	PRED	VARIANCE	ACTUAL	STATION	STATE	REP
1	-82.20	29.97	1.77746	1.02042	1.66	BRADFORD FOREST	FLORIDA	
2	-84.41	33.18	2.04946	0.45604	2.04	GEORGIA STATION	GEORGIA	
3	-89.27	37.71	3.13427	0.30767	2.75	SOUTHERN ILL U	ILLINOIS	
4	-88.67	37.44	2.76575	0.29795	3.20	DIXON SPRINGS	ILLINOIS	
5	-88.37	40.05	3.29114	0.39946	3.38	BONDVILLE	ILLINOIS	
6	-87.99	41.70	3.69292	0.30223	3.14	ARGONNE	ILLINOIS	-
7	-87.09	41.63	3.01211	0.27572	4.40	INDIANA DUNES	INDIANA	++
8	-70.73	44.11	2.88796	0.30028	2.24	BRIDGTON	MAINE	-
9	-69.66	45.49	2.47173	0.38117	1.75	GREENVILLE STATION	MAINE	-
10	-68.01	46.87	1.89674	0.69504	2.26	CARIBOU (A)	MAINE	
11	-85.39	42.41	3.57603	0.43458	2.76	KELLOGG	MICHIGAN	-
12	-93.47	47.53	1.88186	0.77076	1.03	MARCELL	MINNESOTA	
13	-88.74	32.33	2.27728	0.92363	1.63	MERIDIAN	MISSISSIPPI	
14	-71.70	43.94	2.41885	0.30309	3.53	HUBBARD BROOK	NEW HAMPSHIRE	++
15	-79.40	42.30	3.27976	0.42482	3.81	CHAUTAUQUA	NEW YORK	
16	-76.66	42.73	3.34526	0.42435	3.72	AURORA	NEW YORK	
17	-74.04	41.35	2.86010	0.38567	3.37	STILWELL LAKE	NEW YORK	
18	-73.50	42.38	3.36212	0.33685	2.82	KNOBIT	NEW YORK	
19	-83.43	35.06	2.51961	0.22766	2.47	COWEETA	NORTH CAROLINA	
20	-80.62	35.70	2.22365	0.35270	2.72	PIEDMONT STATION	NORTH CAROLINA	
21	-78.87	35.90	1.82012	0.15760	1.60	R TRIANGLE INST	NORTH CAROLINA	
22	-78.86	35.90	1.70293	0.15635	1.81	R TRIANGLE PARK	NORTH CAROLINA	
23	-78.68	35.73	1.82569	0.18118	1.31	FINLEY (A)	NORTH CAROLINA	-
24	-78.28	35.02	1.40462	0.32453	2.06	CLINTON STATION	NORTH CAROLINA	+
25	-77.17	36.13	2.10062	0.41253	1.36	LEWISTON	NORTH CAROLINA	-
26	-83.07	40.35	3.32420	0.32367	2.60	DELAWARE	OHIO	-
27	-81.92	40.78	3.37200	0.29200	2.84	WOOSTER	OHIO	
28	-81.53	39.79	3.28560	0.30281	4.05	CALDWELL	OHIO	+
29	-77.94	40.66	3.80453	0.39052	3.36	LEADING RIDGE	PENNSYLVANIA	
30	-82.84	34.67	2.46749	0.27857	2.04	CLEMSON	SOUTH CAROLINA	
31	-84.29	35.96	2.93914	0.30071	2.84	WALKER BRANCH	TENNESSEE	
32	-83.59	35.66	2.64913	0.23412	3.03	ELKMONT	TENNESSEE	
33	-79.66	39.09	3.15915	0.38332	4.58	PARSONS	WEST VIRGINIA	++
34	-91.88	45.82	1.76406	0.56141	1.75	SPOONER	WISCONSIN	

SULFATE DEPOSITION -- 1982

OBS	LONG	LAT	PRED	VARIANCE	ACTUAL	STATION	STATE	REP
1	-82.20	29.97	2.38949	0.81655	1.90	BRADFORD FOREST	FLORIDA	
2	-80.70	25.39	2.39721	0.84745	1.19	EVERGLADES NAT. PA	FLORIDA	-
3	-84.41	33.18	2.40090	0.60636	2.38	GEORGIA STATION	GEORGIA	
4	-89.27	37.71	2.93258	0.30756	2.73	SOUTHERN ILL U	ILLINOIS	
5	-88.97	38.64	2.76286	0.37597	2.57	SALEM	ILLINOIS	
6	-88.85	41.84	2.91293	0.39817	2.38	NIARC	ILLINOIS	
7	-88.67	37.44	2.70284	0.35098	3.49	DIXON SPRINGS	ILLINOIS	+
8	-88.37	40.05	2.80991	0.43670	2.41	BONDVILLE	ILLINOIS	
9	-87.99	41.70	2.68820	0.30948	3.32	ARGONNE	ILLINOIS	+
10	-87.09	41.63	2.80884	0.35263	3.22	INDIANA DUNES	INDIANA	
11	-69.66	45.49	1.72242	0.53411	1.35	GREENVILLE STATION	MAINE	
12	-68.01	46.87	1.80245	0.66681	1.16	CARIBOU (A)	MAINE	
13	-71.21	42.38	2.39234	0.37313	2.11	EAST	MASSACHUSETTS	
14	-70.02	41.97	1.97185	0.49836	2.87	NACL	MASSACHUSETTS	+
15	-85.39	42.41	2.82314	0.51205	2.51	KELLOGG	MICHIGAN	
16	-84.68	45.56	2.30175	0.76708	2.07	DOUGLAS LAKE	MICHIGAN	
17	-93.47	47.53	1.45419	0.52644	1.04	MARCELL	MINNESOTA	
18	-91.49	47.95	1.53224	0.50942	1.02	FERNBERG	MINNESOTA	
19	-88.74	32.33	2.52277	0.83778	2.70	MERIDIAN	MISSISSIPPI	
20	-92.20	38.75	2.65694	0.66749	2.22	ASHLAND	MISSOURI	
21	-90.32	36.91	2.87929	0.47704	2.63	UNIVERSITY FOREST	MISSOURI	
22	-71.70	43.94	1.96657	0.42985	2.02	HUBBARD BROOK	NEW HAMPSHIRE	
23	-79.40	42.30	2.62378	0.49323	2.96	CHAUTAUQUA	NEW YORK	
24	-77.54	42.11	2.88161	0.36053	1.84	JASPER	NEW YORK	-
25	-76.66	42.73	2.21993	0.40335	2.44	AURORA	NEW YORK	
26	-74.22	43.97	2.03972	0.47431	2.37	HUNTINGTON	NEW YORK	
27	-74.04	41.35	2.25021	0.47129	2.65	STILWELL LAKE	NEW YORK	
28	-73.50	42.38	2.28575	0.31749	1.82	KNOBIT	NEW YORK	
29	-83.43	35.06	2.51080	0.29899	2.29	COWEETA	NORTH CAROLINA	
30	-80.62	35.70	2.68137	0.45621	2.91	PIEDMONT STATION	NORTH CAROLINA	
31	-78.87	35.90	2.69448	0.22362	2.80	R TRIANGLE INST	NORTH CAROLINA	
32	-78.86	35.90	2.64037	0.22233	2.90	R TRIANGLE PARK	NORTH CAROLINA	
33	-78.68	35.73	2.74851	0.26213	2.33	FINLEY (A)	NORTH CAROLINA	
34	-77.17	36.13	2.80470	0.53071	2.14	LEWISTON	NORTH CAROLINA	
35	-83.07	40.35	2.97281	0.42255	2.47	DELAWARE	OHIO	
36	-81.92	40.78	2.91673	0.37758	2.89	WOOSTER	OHIO	
37	-81.53	39.79	3.18383	0.39079	3.30	CALDWELL	OHIO	
38	-77.94	40.66	2.89860	0.46975	3.66	LEADING RIDGE	PENNSYLVANIA	+
39	-82.84	34.67	2.42958	0.36327	2.31	CLEMSON	SOUTH CAROLINA	
40	-84.29	35.96	2.43742	0.39637	3.69	WALKER BRANCH	TENNESSEE	+
41	-83.59	35.66	2.95217	0.30786	2.17	ELKMONT	TENNESSEE	-
42	-73.16	42.88	2.06596	0.31542	2.01	BENNINGTON	VERMONT	
43	-79.66	39.09	3.27339	0.50518	4.01	PARSONS	WEST VIRGINIA	+
44	-91.88	45.82	1.62865	0.51291	1.30	SPOONER	WISCONSIN	
45	-89.65	46.05	1.59081	0.54264	1.90	TROUT LAKE	WISCONSIN	

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                              SULFATE DEPOSITION -- 1983

OBS    LONG     LAT      PRED     VARIANCE   ACTUAL   STATION                STATE             REP

  1   -92.10   33.60   2.11947   0.49863    1.57    WARREN 2MSW            ARKANSAS
  2   -82.20   29.97   1.78108   0.59561    1.83    BRADFORD FOREST        FLORIDA
  3   -84.41   33.18   2.09793   0.37436    1.49    GEORGIA STATION        GEORGIA
  4   -89.27   37.71   2.36449   0.28665    2.33    SOUTHERN ILL U         ILLINOIS
  5   -88.97   38.64   2.48835   0.30909    2.09    SALEM                  ILLINOIS
  6   -88.85   41.84   2.51194   0.31119    2.48    NIARC                  ILLINOIS
  7   -88.67   37.44   2.15994   0.30121    3.09    DIXON SPRINGS          ILLINOIS           +
  8   -87.99   41.70   2.43050   0.28791    3.29    ARGONNE                ILLINOIS           +
  9   -87.09   41.63   2.57444   0.28931    2.78    INDIANA DUNES          INDIANA
 10   -85.99   40.47   2.69145   0.32249    2.21    PURDUE U AG FARM       INDIANA
 11   -69.66   45.49   2.34376   0.50390    1.43    GREENVILLE STATION     MAINE              -
 12   -71.21   42.38   2.26242   0.35539    2.48    EAST                   MASSACHUSETTS
 13   -85.82   44.22   2.10302   0.33247    2.20    WELLSTON               MICHIGAN
 14   -85.39   42.41   2.42921   0.31801    2.66    KELLOGG                MICHIGAN
 15   -84.68   45.56   2.18732   0.40395    1.70    DOUGLAS LAKE           MICHIGAN
 16   -93.47   47.53   1.20156   0.40738    0.95    MARCELL                MINNESOTA
 17   -91.49   47.95   1.22360   0.37673    0.84    FERNBERG               MINNESOTA
 18   -88.74   32.33   1.77006   0.44992    2.21    MERIDIAN               MISSISSIPPI
 19   -92.20   38.75   2.10389   0.41663    2.14    ASHLAND                MISSOURI
 20   -90.32   36.91   2.29779   0.32707    1.84    UNIVERSITY FOREST      MISSOURI
 21   -71.70   43.94   2.16403   0.32383    2.15    HUBBARD BROOK          NEW HAMPSHIRE
 22   -79.40   42.30   2.90094   0.31645    3.15    CHAUTAUQUA             NEW YORK
 23   -77.54   42.11   3.06094   0.28795    1.59    JASPER                 NEW YORK           --
 24   -76.66   42.73   2.80702   0.29184    2.27    AURORA                 NEW YORK
 25   -75.95   43.53   2.36540   0.30965    3.73    BENNETT BRIDGE         NEW YORK           ++
 26   -74.22   43.97   2.51605   0.31546    2.24    HUNTINGTON             NEW YORK
 27   -74.04   41.35   2.40246   0.33626    3.39    STILWELL LAKE          NEW YORK           +
 28   -73.50   42.38   2.64884   0.28501    1.94    KNOBIT                 NEW YORK           -
 29   -80.62   35.70   2.21215   0.33198    2.07    PIEDMONT STATION       NORTH CAROLINA
 30   -78.68   35.73   2.19414   0.30599    2.18    FINLEY (A)             NORTH CAROLINA
 31   -78.28   35.02   2.15740   0.33011    1.99    CLINTON STATION        NORTH CAROLINA
 32   -77.17   36.13   2.39926   0.36054    2.20    LEWISTON               NORTH CAROLINA
 33   -83.07   40.35   2.80417   0.31287    2.36    DELAWARE               OHIO
 34   -81.92   40.78   2.83649   0.30157    2.62    WOOSTER                OHIO
 35   -81.53   39.79   2.68729   0.30754    3.13    CALDWELL               OHIO
 36   -78.77   41.60   2.73723   0.28736    3.88    KANE                   PENNSYLVANIA       ++
 37   -77.94   40.66   2.94484   0.31587    3.02    LEADING RIDGE          PENNSYLVANIA
 38   -82.84   34.67   2.07530   0.33766    1.97    CLEMSON                SOUTH CAROLINA
 39   -84.29   35.96   2.16135   0.35706    2.38    WALKER BRANCH          TENNESSEE
 40   -73.16   42.88   2.38370   0.28227    2.29    BENNINGTON             VERMONT
 41   -79.66   39.09   2.71286   0.33210    3.10    PARSONS                WEST VIRGINIA
 42   -91.88   45.82   1.37896   0.34284    1.43    SPOONER                WISCONSIN
 43   -89.65   46.05   1.50152   0.32646    1.31    TROUT LAKE             WISCONSIN
 44   -89.65   44.66   1.82094   0.33109    1.61    LAKE DUBAY             WISCONSIN
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SULFATE DEPOSITION -- 1984

OBS	LONG	LAT	PRED	VARIANCE	ACTUAL	STATION	STATE	REP
1	-87.24	32.46	1.80040	0.22983	1.66	BLACKBELT	ALABAMA	
2	-93.10	34.18	1.73460	0.46913	2.67	CADDO VALLEY	ARKANSAS	+
3	-82.28	27.38	1.86436	0.75623	1.05	VERNA WELL FIELD	FLORIDA	
4	-84.41	33.18	2.46565	0.28533	1.77	GEORGIA STATION	GEORGIA	-
5	-89.27	37.71	3.01999	0.11702	2.81	SOUTHERN ILL U	ILLINOIS	
6	-88.97	38.64	2.68162	0.16031	3.19	SALEM	ILLINOIS	+
7	-85.85	41.84	2.41451	0.16053	1.89	NIARC	ILLINOIS	-
8	-88.67	37.44	2.74695	0.14160	3.48	DIXON SPRINGS	ILLINOIS	+
9	-88.37	40.05	2.79427	0.18835	2.31	BONDVILLE	ILLINOIS	-
10	-87.99	41.70	2.17833	0.11612	2.72	ARGONNE	ILLINOIS	+
11	-87.09	41.63	2.64630	0.13988	2.41	INDIANA DUNES	INDIANA	
12	-85.99	40.47	2.52867	0.13365	2.94	PURDUE U AG FARM	INDIANA	+
13	-85.46	40.84	2.76728	0.13508	2.62	HUNTINGTON	INDIANA	
14	-84.96	37.68	2.88240	0.22710	2.22	PERRYVILLE	KENTUCKY	-
15	-82.99	37.00	2.55077	0.18449	2.44	LILLEY CORNETT WOO	KENTUCKY	
16	-91.71	29.93	2.02838	0.53737	1.55	IBERIA	LOUISIANA	
17	-70.73	44.11	1.96730	0.14275	1.74	BRIDGTON	MAINE	
18	-69.66	45.49	1.71205	0.19649	1.50	GREENVILLE STATION	MAINE	
19	-68.26	44.37	1.58963	0.24671	2.20	ACADIA > 11/81	MAINE	+
20	-68.01	46.87	1.89411	0.37271	1.32	CARIBOU (A)	MAINE	
21	-76.15	38.91	2.80596	0.24085	2.70	WYE	MARYLAND	
22	-71.21	42.38	2.17702	0.15736	2.28	EAST	MASSACHUSETTS	
23	-70.02	41.97	2.30244	0.22134	1.98	NACL	MASSACHUSETTS	
24	-88.55	47.11	1.51225	0.28746	0.98	CHASSELL	MICHIGAN	
25	-85.82	44.22	1.95653	0.34829	2.80	WELLSTON	MICHIGAN	+
26	-88.74	32.33	1.75785	0.24190	1.73	MERIDIAN	MISSISSIPPI	
27	-92.20	38.75	2.27326	0.36391	1.92	ASHLAND	MISSOURI	
28	-90.32	36.91	2.74042	0.20719	2.09	UNIVERSITY FOREST	MISSOURI	-
29	-71.70	43.94	1.90681	0.14237	2.08	HUBBARD BROOK	NEW HAMPSHIRE	
30	-74.85	40.31	2.93625	0.18973	2.78	WASHINGTON XING	NEW JERSEY	
31	-79.40	42.30	3.37958	0.25368	3.77	CHAUTAUQUA	NEW YORK	
32	-76.66	42.73	3.45384	0.17031	3.22	AURORA	NEW YORK	
33	-75.95	43.53	2.73569	0.16657	3.42	BENNETT BRIDGE	NEW YORK	+
34	-74.22	43.97	2.79097	0.18670	1.92	HUNTINGTON	NEW YORK	--
35	-74.05	41.35	2.72517	0.18391	2.90	WEST POINT	NEW YORK	
36	-80.62	35.70	2.40429	0.20752	2.22	PIEDMONT STATION	NORTH CAROLINA	
37	-78.68	35.73	2.09622	0.14620	1.88	FINLEY (A)	NORTH CAROLINA	
38	-78.28	35.02	1.94267	0.18344	2.05	CLINTON STATION	NORTH CAROLINA	
39	-77.17	36.13	2.18158	0.22580	1.84	LEWISTON	NORTH CAROLINA	
40	-83.07	40.35	2.88053	0.16641	2.39	DELAWARE	OHIO	-
41	-81.92	40.78	2.97298	0.16056	3.02	WOOSTER	OHIO	
42	-81.53	39.79	2.92643	0.16034	3.16	CALDWELL	OHIO	
43	-77.95	40.79	3.66849	0.08570	3.77	PENN STATE	PENNSYLVANIA	
44	-77.94	40.66	3.63949	0.08602	3.77	LEADING RIDGE	PENNSYLVANIA	
45	-82.84	34.67	2.20072	0.19320	3.07	CLEMSON	SOUTH CAROLINA	+
46	-84.29	35.96	2.37957	0.14698	3.08	WALKER BRANCH	TENNESSEE	+
47	-83.59	35.66	2.89331	0.12982	2.37	ELKMONT	TENNESSEE	-
48	-73.16	42.88	2.39405	0.16494	2.56	BENNINGTON	VERMONT	
49	-80.95	37.98	2.80849	0.19534	2.78	BABCOCK STATE PARK	WEST VIRGINIA	
50	-79.66	39.09	3.09972	0.19570	3.45	PARSONS	WEST VIRGINIA	
51	-91.88	45.82	1.27511	0.31018	1.17	SPOONER	WISCONSIN	
52	-89.65	46.05	1.27658	0.16882	1.16	TROUT LAKE	WISCONSIN	
53	-89.65	44.66	1.57144	0.21805	1.62	LAKE DUBAY	WISCONSIN	

SULFATE CONCENTRATION -- 1981

OBS	LONG	LAT	PRED	VARIANCE	ACTUAL	STATION	STATE	REP
1	-82.20	29.97	1.89573	1.01190	1.86	BRADFORD FOREST	FLORIDA	
2	-84.41	33.18	2.13387	0.39055	2.09	GEORGIA STATION	GEORGIA	
3	-89.27	37.71	2.85264	0.17732	2.60	SOUTHERN ILL U	ILLINOIS	
4	-88.67	37.44	2.63652	0.17162	2.83	DIXON SPRINGS	ILLINOIS	
5	-88.37	40.05	3.25236	0.32314	3.36	BONDVILLE	ILLINOIS	
6	-87.99	41.70	3.73382	0.19154	3.38	ARGONNE	ILLINOIS	
7	-87.09	41.63	3.36137	0.16683	4.05	INDIANA DUNES	INDIANA	+
8	-70.73	44.11	2.07096	0.18786	2.07	BRIDGTON	MAINE	
9	-69.66	45.49	2.03573	0.28823	1.54	GREENVILLE STATION	MAINE	
10	-68.01	46.87	1.58295	0.60510	1.91	CARIBOU (A)	MAINE	
11	-85.39	42.41	3.74638	0.35411	3.28	KELLOGG	MICHIGAN	
12	-93.47	47.53	2.28597	0.68120	1.32	MARCELL	MINNESOTA	-
13	-88.74	32.33	2.15833	0.91141	1.54	MERIDIAN	MISSISSIPPI	
14	-71.70	43.94	2.31933	0.19291	2.33	HUBBARD BROOK	NEW HAMPSHIRE	
15	-79.40	42.30	3.64826	0.34591	3.71	CHAUTAUQUA	NEW YORK	
16	-76.66	42.73	3.25210	0.35017	3.90	AURORA	NEW YORK	+
17	-74.04	41.35	2.92303	0.28807	2.86	STILWELL LAKE	NEW YORK	
18	-73.50	42.38	2.83694	0.23882	2.93	KNOBIT	NEW YORK	
19	-83.43	35.06	2.46494	0.11799	1.78	COWEETA	NORTH CAROLINA	-
20	-80.62	35.70	2.24254	0.27976	2.74	PIEDMONT STATION	NORTH CAROLINA	
21	-78.87	35.90	1.86166	0.02198	1.77	R TRIANGLE INST	NORTH CAROLINA	
22	-78.86	35.90	1.78180	0.02134	1.85	R TRIANGLE PARK	NORTH CAROLINA	
23	-78.68	35.73	1.81363	0.06984	1.71	FINLEY (A)	NORTH CAROLINA	
24	-78.28	35.02	1.74019	0.22911	1.82	CLINTON STATION	NORTH CAROLINA	
25	-77.17	36.13	1.97420	0.33600	1.71	LEWISTON	NORTH CAROLINA	
26	-83.07	40.35	3.73460	0.22996	3.30	DELAWARE	OHIO	
27	-81.92	40.78	3.77346	0.19471	3.46	WOOSTER	OHIO	
28	-81.53	39.79	3.43354	0.20872	4.46	CALDWELL	OHIO	++
29	-77.94	40.66	3.51628	0.31511	3.48	LEADING RIDGE	PENNSYLVANIA	
30	-82.84	34.67	1.92435	0.17324	2.75	CLEMSON	SOUTH CAROLINA	+
31	-84.29	35.96	2.26399	0.19203	2.98	WALKER BRANCH	TENNESSEE	+
32	-83.59	35.66	2.48573	0.12240	2.13	ELKMONT	TENNESSEE	-
33	-79.66	39.09	3.58975	0.30310	3.54	PARSONS	WEST VIRGINIA	
34	-91.88	45.82	1.90828	0.48263	2.28	SPOONER	WISCONSIN	

SULFATE CONCENTRATION -- 1982

OBS	LONG	LAT	PRED	VARIANCE	ACTUAL	STATION	STATE	REP
1	-82.20	29.97	1.37263	0.72120	1.26	BRADFORD FOREST	FLORIDA	
2	-80.70	25.39	1.47987	1.12951	0.74	EVERGLADES NAT. PA	FLORIDA	
3	-84.41	33.18	1.59343	0.47118	1.73	GEORGIA STATION	GEORGIA	
4	-89.27	37.71	2.21254	0.28443	2.10	SOUTHERN ILL U	ILLINOIS	
5	-88.97	38.64	2.32296	0.32876	2.39	SALEM	ILLINOIS	
6	-88.85	41.84	2.72600	0.34394	2.50	NIARC	ILLINOIS	
7	-88.67	37.44	2.17701	0.31831	2.28	DIXON SPRINGS	ILLINOIS	
8	-88.37	40.05	2.59062	0.36680	2.71	BONDVILLE	ILLINOIS	
9	-87.99	41.70	2.69267	0.28638	3.11	ARGONNE	ILLINOIS	
10	-87.09	41.63	2.90184	0.31387	2.97	INDIANA DUNES	INDIANA	
11	-69.66	45.49	1.67139	0.44258	1.58	GREENVILLE STATION	MAINE	
12	-68.01	46.87	1.76731	0.66440	1.22	CARIBOU (A)	MAINE	
13	-71.21	42.38	2.12401	0.33068	2.19	EAST	MASSACHUSETTS	
14	-70.02	41.97	2.03749	0.44656	2.14	NACL	MASSACHUSETTS	
15	-85.39	42.41	2.89595	0.41329	2.95	KELLOGG	MICHIGAN	
16	-84.68	45.56	2.47233	0.65027	2.37	DOUGLAS LAKE	MICHIGAN	
17	-93.47	47.53	1.45122	0.48852	1.28	MARCELL	MINNESOTA	
18	-91.49	47.95	1.52441	0.45048	1.30	FERNBERG	MINNESOTA	
19	-88.74	32.33	1.79984	0.80486	1.63	MERIDIAN	MISSISSIPPI	
20	-92.20	38.75	2.24201	0.59742	1.77	ASHLAND	MISSOURI	
21	-90.32	36.91	1.99437	0.40216	1.94	UNIVERSITY FOREST	MISSOURI	
22	-71.70	43.94	2.04679	0.36435	1.99	HUBBARD BROOK	NEW HAMPSHIRE	
23	-79.40	42.30	3.01804	0.41273	3.09	CHAUTAUQUA	NEW YORK	
24	-77.54	42.11	3.15353	0.32085	2.42	JASPER	NEW YORK	-
25	-76.66	42.73	2.54614	0.34972	3.28	AURORA	NEW YORK	+
26	-74.22	43.97	2.41444	0.39873	2.29	HUNTINGTON	NEW YORK	
27	-74.04	41.35	2.57949	0.39740	2.29	STILWELL LAKE	NEW YORK	
28	-73.50	42.38	2.36145	0.28997	2.29	KNOBIT	NEW YORK	
29	-83.43	35.06	1.86588	0.27743	1.26	COWEETA	NORTH CAROLINA	-
30	-80.62	35.70	1.90363	0.37779	2.67	PIEDMONT STATION	NORTH CAROLINA	+
31	-78.87	35.90	2.03947	0.22518	2.01	R TRIANGLE INST	NORTH CAROLINA	
32	-78.86	35.90	2.07042	0.22431	1.93	R TRIANGLE PARK	NORTH CAROLINA	
33	-78.68	35.73	2.01282	0.25218	1.98	FINLEY (A)	NORTH CAROLINA	
34	-77.17	36.13	2.24204	0.46492	1.84	LEWISTON	NORTH CAROLINA	
35	-83.07	40.35	3.14969	0.35879	3.03	DELAWARE	OHIO	
36	-81.92	40.78	3.13098	0.33094	3.30	WOOSTER	OHIO	
37	-81.53	39.79	2.99694	0.33941	3.43	CALDWELL	OHIO	
38	-77.94	40.66	2.71553	0.39108	3.52	LEADING RIDGE	PENNSYLVANIA	+
39	-82.84	34.67	1.66754	0.32008	1.84	CLEMSON	SOUTH CAROLINA	
40	-84.29	35.96	1.72106	0.34223	2.54	WALKER BRANCH	TENNESSEE	+
41	-83.59	35.66	2.05843	0.28396	1.41	ELKMONT	TENNESSEE	-
42	-73.16	42.88	2.25722	0.28781	2.31	BENNINGTON	VERMONT	
43	-79.66	39.09	3.05731	0.40952	2.64	PARSONS	WEST VIRGINIA	
44	-91.88	45.82	1.66468	0.43221	1.55	SPOONER	WISCONSIN	
45	-89.65	46.05	1.81921	0.43597	1.82	TROUT LAKE	WISCONSIN	

SULFATE CONCENTRATION -- 1983

OBS	LONG	LAT	PRED	VARIANCE	ACTUAL	STATION	STATE	REP
1	-92.10	33.60	1.47842	0.59094	1.18	WARREN 2WSW	ARKANSAS	
2	-82.20	29.97	1.28687	0.75228	1.15	BRADFORD FOREST	FLORIDA	
3	-84.41	33.18	1.52942	0.41093	1.24	GEORGIA STATION	GEORGIA	
4	-89.27	37.71	1.97609	0.26951	1.99	SOUTHERN ILL U	ILLINOIS	
5	-88.97	38.64	2.18351	0.31399	2.04	SALEM	ILLINOIS	
6	-88.85	41.84	2.63911	0.31238	2.48	NIARC	ILLINOIS	
7	-88.67	37.44	1.94277	0.29320	2.10	DIXON SPRINGS	ILLINOIS	
8	-87.99	41.70	2.61941	0.27230	2.92	ARGONNE	ILLINOIS	
9	-87.09	41.63	2.67577	0.27994	2.98	INDIANA DUNES	INDIANA	
10	-85.99	40.47	2.70953	0.33891	2.60	PURDUE U AG FARM	INDIANA	
11	-69.66	45.49	1.78834	0.60100	0.99	GREENVILLE STATION	MAINE	-
12	-71.21	42.38	1.58959	0.38072	1.86	EAST	MASSACHUSETTS	
13	-85.82	44.22	2.35088	0.34516	2.27	WELLSTON	MICHIGAN	
14	-85.39	42.41	2.61983	0.33135	2.81	KELLOGG	MICHIGAN	
15	-84.68	45.56	2.30341	0.44911	1.90	DOUGLAS LAKE	MICHIGAN	
16	-93.47	47.53	1.27802	0.43826	1.35	MARCELL	MINNESOTA	
17	-91.49	47.95	1.47092	0.39847	0.95	FERNBERG	MINNESOTA	
18	-88.74	32.33	1.29235	0.52336	1.24	MERIDIAN	MISSISSIPPI	
19	-92.20	38.75	1.90865	0.48322	2.07	ASHLAND	MISSOURI	
20	-90.32	36.91	1.85100	0.33870	1.61	UNIVERSITY FOREST	MISSOURI	
21	-71.70	43.94	1.62555	0.33043	1.64	HUBBARD BROOK	NEW HAMPSHIRE	
22	-79.40	42.30	2.84509	0.32311	3.02	CHAUTAUQUA	NEW YORK	
23	-77.54	42.11	2.75000	0.27959	2.37	JASPER	NEW YORK	
24	-76.66	42.73	2.42547	0.28506	2.88	AURORA	NEW YORK	
25	-75.95	43.53	2.34948	0.31115	2.59	BENNETT BRIDGE	NEW YORK	
26	-74.22	43.97	2.05458	0.32313	1.89	HUNTINGTON	NEW YORK	
27	-74.04	41.35	2.06229	0.35511	1.83	STILWELL LAKE	NEW YORK	
28	-73.50	42.38	1.97475	0.27169	1.60	KNOBIT	NEW YORK	
29	-80.62	35.70	1.87148	0.35028	1.89	PIEDMONT STATION	NORTH CAROLINA	
30	-78.68	35.73	1.86938	0.29627	1.82	FINLEY (A)	NORTH CAROLINA	
31	-78.28	35.02	1.83171	0.33096	1.56	CLINTON STATION	NORTH CAROLINA	
32	-77.17	36.13	1.81925	0.38249	2.09	LEWISTON	NORTH CAROLINA	
33	-83.07	40.35	2.89514	0.31528	2.71	DELAWARE	OHIO	
34	-81.92	40.78	2.84263	0.29947	3.05	WOOSTER	OHIO	
35	-81.53	39.79	2.70777	0.30790	3.02	CALDWELL	OHIO	
36	-78.77	41.60	2.73522	0.27754	3.03	KANE	PENNSYLVANIA	
37	-77.94	40.66	2.59949	0.32496	2.61	LEADING RIDGE	PENNSYLVANIA	
38	-82.84	34.67	1.70399	0.35288	1.64	CLEMSON	SOUTH CAROLINA	
39	-84.29	35.96	1.87943	0.38989	2.06	WALKER BRANCH	TENNESSEE	
40	-73.16	42.88	1.79947	0.26909	1.92	BENNINGTON	VERMONT	
41	-79.66	39.09	2.59440	0.35321	2.52	PARSONS	WEST VIRGINIA	
42	-91.88	45.82	1.71642	0.35894	1.57	SPOONER	WISCONSIN	
43	-89.65	46.05	1.82414	0.33691	1.57	TROUT LAKE	WISCONSIN	
44	-89.65	44.66	1.93158	0.34767	2.52	LAKE DUBAY	WISCONSIN	

SULFATE CONCENTRATION -- 1984

OBS	LONG	LAT	PRED	VARIANCE	ACTUAL	STATION	STATE	REP
1	-87.24	32.46	1.46339	0.22272	1.50	BLACKBELT	ALABAMA	
2	-93.10	34.18	1.33121	0.36240	1.55	CADDO VALLEY	ARKANSAS	
3	-82.28	27.38	1.41993	0.73463	1.17	VERNA WELL FIELD	FLORIDA	
4	-84.41	33.18	1.84499	0.25218	1.60	GEORGIA STATION	GEORGIA	
5	-89.27	37.71	2.17110	0.14611	2.12	SOUTHERN ILL U	ILLINOIS	
6	-88.97	38.64	2.32128	0.16985	2.62	SALEM	ILLINOIS	
7	-88.85	41.84	2.67527	0.17485	2.32	NIARC	ILLINOIS	
8	-88.67	37.44	2.12292	0.16231	2.37	DIXON SPRINGS	ILLINOIS	
9	-88.37	40.05	2.69047	0.18526	2.79	BONDVILLE	ILLINOIS	
10	-87.99	41.70	2.72738	0.14602	2.93	ARGONNE	ILLINOIS	
11	-87.09	41.63	2.85517	0.15785	3.20	INDIANA DUNES	INDIANA	
12	-85.99	40.47	2.90995	0.15706	3.33	PURDUE U AG FARM	INDIANA	+
13	-85.46	40.84	3.13937	0.15883	2.99	HUNTINGTON	INDIANA	
14	-84.96	37.68	2.47384	0.20757	2.13	PERRYVILLE	KENTUCKY	
15	-82.99	37.08	2.21194	0.18249	2.05	LILLEY CORNETT WOO	KENTUCKY	
16	-91.71	29.93	1.25364	0.45554	1.22	IBERIA	LOUISIANA	
17	-70.73	44.11	1.59342	0.16128	1.60	BRIDGTON	MAINE	
18	-69.66	45.49	1.57550	0.19559	1.27	GREENVILLE STATION	MAINE	
19	-68.26	44.37	1.40177	0.22819	1.54	ACADIA > 11/81	MAINE	
20	-68.01	46.87	1.41221	0.33695	1.48	CARIBOU (A)	MAINE	
21	-76.15	38.91	2.26706	0.22131	2.55	WYE	MARYLAND	
22	-71.21	42.38	1.74068	0.17086	1.86	EAST	MASSACHUSETTS	
23	-70.02	41.97	1.80351	0.22040	1.47	NACL	MASSACHUSETTS	
24	-88.55	47.11	1.67971	0.27013	1.32	CHASSELL	MICHIGAN	
25	-85.82	44.22	2.37611	0.28062	2.52	WELLSTON	MICHIGAN	
26	-88.74	32.33	1.48051	0.22811	1.27	MERIDIAN	MISSISSIPPI	
27	-92.20	38.75	1.94843	0.30343	1.61	ASHLAND	MISSOURI	
28	-90.32	36.91	1.94003	0.19941	1.46	UNIVERSITY FOREST	MISSOURI	-
29	-71.70	43.94	1.74052	0.16109	1.66	HUBBARD BROOK	NEW HAMPSHIRE	
30	-74.85	40.31	2.47303	0.19377	2.35	WASHINGTON XING	NEW JERSEY	
31	-79.40	42.30	3.26960	0.22865	3.22	CHAUTAUQUA	NEW YORK	
32	-76.66	42.73	2.78250	0.17858	3.25	AURORA	NEW YORK	+
33	-75.95	43.53	2.60225	0.18060	2.77	BENNETT BRIDGE	NEW YORK	
34	-74.22	43.97	2.33075	0.18952	1.77	HUNTINGTON	NEW YORK	-
35	-74.05	41.35	2.34944	0.18610	2.11	WEST POINT	NEW YORK	
36	-80.62	35.70	1.87536	0.19841	1.99	PIEDMONT STATION	NORTH CAROLINA	
37	-78.68	35.73	1.70725	0.16456	1.57	FINLEY (A)	NORTH CAROLINA	
38	-78.28	35.02	1.62630	0.19460	1.54	CLINTON STATION	NORTH CAROLINA	
39	-77.17	36.13	1.84096	0.21591	1.38	LEWISTON	NORTH CAROLINA	
40	-83.07	40.35	3.18039	0.17469	2.98	DELAWARE	OHIO	
41	-81.92	40.78	3.21606	0.17289	3.34	WOOSTER	OHIO	
42	-81.53	39.79	2.83700	0.16925	3.59	CALDWELL	OHIO	+
43	-77.95	40.79	3.13684	0.13400	3.32	PENN STATE	PENNSYLVANIA	
44	-77.94	40.66	3.09797	0.13432	3.33	LEADING RIDGE	PENNSYLVANIA	
45	-82.84	34.67	1.76182	0.19267	2.31	CLEMSON	SOUTH CAROLINA	+
46	-84.29	35.96	1.86659	0.16480	2.42	WALKER BRANCH	TENNESSEE	+
47	-83.59	35.66	2.21640	0.15412	1.60	ELKMONT	TENNESSEE	-
48	-73.16	42.88	1.97531	0.17149	2.24	BENNINGTON	VERMONT	
49	-80.95	37.98	2.41915	0.19125	2.22	BABCOCK STATE PARK	WEST VIRGINIA	
50	-79.66	39.09	2.83214	0.19068	2.46	PARSONS	WEST VIRGINIA	
51	-91.88	45.82	1.60925	0.28088	1.46	SPOONER	WISCONSIN	
52	-89.65	46.05	1.63144	0.18015	1.44	TROUT LAKE	WISCONSIN	
53	-89.65	44.66	1.85351	0.20646	1.99	LAKE DUBAY	WISCONSIN	

NITRATE DEPOSITION -- 1981

OBS	LONG	LAT	PRED	VARIANCE	ACTUAL	STATION	STATE	REP
1	-82.20	29.97	0.83634	0.47594	0.74	BRADFORD FOREST	FLORIDA	
2	-84.41	33.18	0.93121	0.21470	0.66	GEORGIA STATION	GEORGIA	
3	-89.27	37.71	1.40486	0.14737	1.40	SOUTHERN ILL U	ILLINOIS	
4	-88.67	37.44	1.37115	0.14272	1.39	DIXON SPRINGS	ILLINOIS	
5	-88.37	40.05	1.65303	0.18867	1.67	BONDVILLE	ILLINOIS	
6	-87.99	41.70	1.96470	0.14425	1.56	ARGONNE	ILLINOIS	-
7	-87.09	41.63	1.54788	0.13190	2.36	INDIANA DUNES	INDIANA	++
8	-70.73	44.11	1.60064	0.14342	1.24	BRIDGTON	MAINE	
9	-69.66	45.49	1.23507	0.18065	0.91	GREENVILLE STATION	MAINE	
10	-68.01	46.87	1.01020	0.32665	0.93	CARIBOU (A)	MAINE	
11	-85.39	42.41	1.91840	0.20507	1.54	KELLOGG	MICHIGAN	
12	-93.47	47.53	1.15947	0.36215	0.85	MARCELL	MINNESOTA	
13	-88.74	32.33	1.00587	0.43104	0.78	MERIDIAN	MISSISSIPPI	
14	-71.70	43.94	1.37494	0.14464	1.99	HUBBARD BROOK	NEW HAMPSHIRE	+
15	-79.40	42.30	1.83562	0.20048	2.16	CHAUTAUQUA	NEW YORK	
16	-76.66	42.73	1.94745	0.20018	2.15	AURORA	NEW YORK	
17	-74.04	41.35	1.71123	0.18275	2.02	STILWELL LAKE	NEW YORK	
18	-73.50	42.38	1.95954	0.16008	1.73	KNOBIT	NEW YORK	
19	-83.43	35.06	1.11583	0.10951	1.17	COWEETA	NORTH CAROLINA	
20	-80.62	35.70	1.11273	0.16674	1.29	PIEDMONT STATION	NORTH CAROLINA	
21	-78.87	35.90	0.98522	0.07736	0.85	R TRIANGLE INST	NORTH CAROLINA	
22	-78.86	35.90	0.91140	0.07678	0.99	R TRIANGLE PARK	NORTH CAROLINA	
23	-78.68	35.73	0.96586	0.08795	0.76	FINLEY (A)	NORTH CAROLINA	
24	-78.28	35.02	0.76479	0.15414	1.05	CLINTON STATION	NORTH CAROLINA	
25	-77.17	36.13	1.16005	0.19474	0.75	LEWISTON	NORTH CAROLINA	
26	-83.07	40.35	1.65699	0.15380	1.39	DELAWARE	OHIO	
27	-81.92	40.78	1.72721	0.13917	1.51	WOOSTER	OHIO	
28	-81.53	39.79	1.73156	0.14411	1.82	CALDWELL	OHIO	
29	-77.94	40.66	2.10135	0.18443	1.90	LEADING RIDGE	PENNSYLVANIA	
30	-82.84	34.67	1.14245	0.13299	0.92	CLEMSON	SOUTH CAROLINA	
31	-84.29	35.96	1.32982	0.14337	1.16	WALKER BRANCH	TENNESSEE	
32	-83.59	35.66	1.16587	0.11259	1.37	ELKMONT	TENNESSEE	
33	-79.66	39.09	1.58760	0.18116	2.44	PARSONS	WEST VIRGINIA	++
34	-91.88	45.82	1.13333	0.26428	1.09	SPOONER	WISCONSIN	

NITRATE DEPOSITION -- 1982

OBS	LONG	LAT	PRED	VARIANCE	ACTUAL	STATION	STATE	REP
1	-82.20	29.97	1.05624	0.37423	1.00	BRADFORD FOREST	FLORIDA	
2	-80.70	25.39	1.20365	0.47933	0.89	EVERGLADES NAT. PA	FLORIDA	
3	-84.41	33.18	1.16257	0.26171	0.97	GEORGIA STATION	GEORGIA	
4	-89.27	37.71	1.40916	0.18616	1.33	SOUTHERN ILL U	ILLINOIS	
5	-88.97	38.64	1.38874	0.20145	1.27	SALEM	ILLINOIS	
6	-88.85	41.84	1.48529	0.21047	1.27	NIARC	ILLINOIS	
7	-88.67	37.44	1.32463	0.20033	1.59	DIXON SPRINGS	ILLINOIS	
8	-88.37	40.05	1.46035	0.21576	1.19	BONDVILLE	ILLINOIS	
9	-87.99	41.70	1.45970	0.18751	1.64	ARGONNE	ILLINOIS	
10	-87.09	41.63	1.48458	0.19683	1.80	INDIANA DUNES	INDIANA	
11	-69.66	45.49	1.09363	0.25550	0.82	GREENVILLE STATION	MAINE	
12	-68.01	46.87	1.06650	0.34592	0.66	CARIBOU (A)	MAINE	
13	-71.21	42.38	1.36141	0.20459	1.13	EAST	MASSACHUSETTS	
14	-70.02	41.97	1.17531	0.25521	1.44	NACL	MASSACHUSETTS	
15	-85.39	42.41	1.59918	0.23662	1.63	KELLOGG	MICHIGAN	
16	-84.68	45.56	1.45246	0.33584	1.52	DOUGLAS LAKE	MICHIGAN	
17	-93.47	47.53	0.91314	0.27336	0.78	MARCELL	MINNESOTA	
18	-91.49	47.95	1.02100	0.25682	0.67	FERNBERG	MINNESOTA	
19	-88.74	32.33	1.18624	0.39401	1.39	MERIDIAN	MISSISSIPPI	
20	-92.20	38.75	1.34144	0.31036	1.40	ASHLAND	MISSOURI	
21	-90.32	36.91	1.40062	0.23423	1.36	UNIVERSITY FOREST	MISSOURI	
22	-71.70	43.94	1.13514	0.21565	1.58	HUBBARD BROOK	NEW HAMPSHIRE	
23	-79.40	42.30	1.57842	0.23618	1.86	CHAUTAUQUA	NEW YORK	
24	-77.54	42.11	1.76221	0.20030	1.22	JASPER	NEW YORK	-
25	-76.66	42.73	1.48994	0.21148	1.56	AURORA	NEW YORK	
26	-74.22	43.97	1.33970	0.22982	1.40	HUNTINGTON	NEW YORK	
27	-74.04	41.35	1.40672	0.22968	1.63	STILWELL LAKE	NEW YORK	
28	-73.50	42.38	1.40159	0.18644	1.18	KNOBIT	NEW YORK	
29	-83.43	35.06	1.18419	0.18246	1.07	COWEETA	NORTH CAROLINA	
30	-80.62	35.70	1.33181	0.21895	1.37	PIEDMONT STATION	NORTH CAROLINA	
31	-78.87	35.90	1.39025	0.16319	1.43	R TRIANGLE INST	NORTH CAROLINA	
32	-78.86	35.90	1.32147	0.16291	1.62	R TRIANGLE PARK	NORTH CAROLINA	
33	-78.68	35.73	1.42161	0.17326	1.18	FINLEY (A)	NORTH CAROLINA	
34	-77.17	36.13	1.54268	0.25739	1.12	LEWISTON	NORTH CAROLINA	
35	-83.07	40.35	1.61329	0.21580	1.43	DELAWARE	OHIO	
36	-81.92	40.78	1.64761	0.20424	1.60	WOOSTER	OHIO	
37	-81.53	39.79	1.67064	0.20735	1.61	CALDWELL	OHIO	
38	-77.94	40.66	1.62690	0.22710	2.25	LEADING RIDGE	PENNSYLVANIA	+
39	-82.84	34.67	1.15632	0.19889	1.08	CLEMSON	SOUTH CAROLINA	
40	-84.29	35.96	1.20414	0.20978	1.41	WALKER BRANCH	TENNESSEE	
41	-83.59	35.66	1.25866	0.18567	1.13	ELKMONT	TENNESSEE	
42	-73.16	42.88	1.34717	0.18487	1.18	BENNINGTON	VERMONT	
43	-79.66	39.09	1.68211	0.23448	1.97	PARSONS	WEST VIRGINIA	
44	-91.88	45.82	1.05374	0.24833	0.94	SPOONER	WISCONSIN	
45	-89.65	46.05	1.07753	0.24924	1.26	TROUT LAKE	WISCONSIN	

NITRATE DEPOSITION -- 1983

OBS	LONG	LAT	PRED	VARIANCE	ACTUAL	STATION	STATE	REI
1	-92.10	33.60	1.20325	0.18051	1.05	WARREN 2WSW	ARKANSAS	
2	-82.20	29.97	0.94621	0.21984	1.03	BRADFORD FOREST	FLORIDA	
3	-84.41	33.18	1.09990	0.13236	0.78	GEORGIA STATION	GEORGIA	
4	-89.27	37.71	1.30374	0.09722	1.24	SOUTHERN ILL U	ILLINOIS	
5	-88.97	38.64	1.39753	0.10690	1.14	SALEM	ILLINOIS	
6	-88.85	41.84	1.66125	0.10742	1.38	NIARC	ILLINOIS	
7	-88.67	37.44	1.19995	0.10309	1.50	DIXON SPRINGS	ILLINOIS	
8	-87.99	41.70	1.49519	0.09784	2.18	ARGONNE	ILLINOIS	++
9	-87.09	41.63	1.69267	0.09882	1.70	INDIANA DUNES	INDIANA	
10	-85.99	40.47	1.62449	0.11257	1.36	PURDUE U AG FARM	INDIANA	
11	-69.66	45.49	1.50624	0.18285	0.79	GREENVILLE STATION	MAINE	-
12	-71.21	42.38	1.50546	0.12480	1.11	EAST	MASSACHUSETTS	-
13	-85.82	44.22	1.48100	0.11574	1.73	WELLSTON	MICHIGAN	
14	-85.39	42.41	1.58123	0.11075	2.00	KELLOGG	MICHIGAN	+
15	-84.68	45.56	1.58210	0.14352	1.31	DOUGLAS LAKE	MICHIGAN	
16	-93.47	47.53	0.93861	0.14340	0.82	MARCELL	MINNESOTA	
17	-91.49	47.95	0.98032	0.13188	0.71	FERNBERG	MINNESOTA	
18	-88.74	32.33	1.02447	0.16189	1.17	MERIDIAN	MISSISSIPPI	
19	-92.20	38.75	1.25030	0.14971	1.36	ASHLAND	MISSOURI	
20	-90.32	36.91	1.26649	0.11373	1.19	UNIVERSITY FOREST	MISSOURI	
21	-71.70	43.94	1.28314	0.11215	1.55	HUBBARD BROOK	NEW HAMPSHIRE	
22	-79.40	42.30	1.67170	0.10968	1.89	CHAUTAUQUA	NEW YORK	
23	-77.54	42.11	1.86249	0.09841	0.97	JASPER	NEW YORK	--
24	-76.66	42.73	1.84489	0.09994	1.44	AURORA	NEW YORK	-
25	-75.95	43.53	1.49510	0.10689	2.81	BENNETT BRIDGE	NEW YORK	++
26	-74.22	43.97	1.73914	0.10941	1.48	HUNTINGTON	NEW YORK	
27	-74.04	41.35	1.50502	0.11764	2.14	STILWELL LAKE	NEW YORK	+
28	-73.50	42.38	1.65945	0.09698	1.50	KNOBIT	NEW YORK	
29	-80.62	35.70	1.19564	0.11602	1.19	PIEDMONT STATION	NORTH CAROLINA	
30	-78.68	35.73	1.18193	0.10454	1.34	FINLEY (A)	NORTH CAROLINA	
31	-78.28	35.02	1.25373	0.11390	0.99	CLINTON STATION	NORTH CAROLINA	
32	-77.17	36.13	1.37925	0.12630	1.22	LEWISTON	NORTH CAROLINA	
33	-83.07	40.35	1.62757	0.10806	1.38	DELAWARE	OHIO	
34	-81.92	40.78	1.63579	0.10372	1.49	WOOSTER	OHIO	
35	-81.53	39.79	1.54564	0.10601	1.64	CALDWELL	OHIO	
36	-78.77	41.60	1.65928	0.09811	1.90	KANE	PENNSYLVANIA	
37	-77.94	40.66	1.66476	0.10967	1.90	LEADING RIDGE	PENNSYLVANIA	
38	-82.84	34.67	1.04881	0.11776	1.09	CLEMSON	SOUTH CAROLINA	
39	-84.29	35.96	1.17392	0.12601	1.01	WALKER BRANCH	TENNESSEE	
40	-73.16	42.88	1.56831	0.09603	1.47	BENNINGTON	VERMONT	
41	-79.66	39.09	1.54486	0.11634	1.71	PARSONS	WEST VIRGINIA	
42	-91.88	45.82	0.99297	0.11957	1.22	SPOONER	WISCONSIN	
43	-89.65	46.05	1.15292	0.11343	0.94	TROUT LAKE	WISCONSIN	
44	-89.65	44.66	1.29899	0.11562	1.16	LAKE DUBAY	WISCONSIN	

NITRATE DEPOSITION -- 1984

OBS	LONG	LAT	PRED	VARIANCE	ACTUAL	STATION	STATE
1	-87.24	32.46	0.98210	0.09568	0.99	BLACKBELT	ALABAMA
2	-93.10	34.18	1.16675	0.20429	1.83	CADDO VALLEY	ARKANSAS
3	-82.28	27.38	1.06594	0.31773	0.70	VERNA WELL FIELD	FLORIDA
4	-84.41	33.18	1.32431	0.12127	0.88	GEORGIA STATION	GEORGIA
5	-89.27	37.71	1.60376	0.04561	1.49	SOUTHERN ILL U	ILLINOIS
6	-88.97	38.64	1.45709	0.06539	1.63	SALEM	ILLINOIS
7	-88.85	41.84	1.39808	0.06472	1.16	NIARC	ILLINOIS
8	-88.67	37.44	1.49766	0.05642	1.71	DIXON SPRINGS	ILLINOIS
9	-88.37	40.05	1.54461	0.07825	1.34	BONDVILLE	ILLINOIS
10	-87.99	41.70	1.27950	0.04504	1.54	ARGONNE	ILLINOIS
11	-87.09	41.63	1.62048	0.05601	1.34	INDIANA DUNES	INDIANA
12	-85.99	40.47	1.52542	0.05280	1.79	PURDUE U AG FARM	INDIANA
13	-85.46	40.84	1.72690	0.05330	1.62	HUNTINGTON	INDIANA
14	-84.96	37.68	1.58093	0.09589	1.31	PERRYVILLE	KENTUCKY
15	-82.99	37.08	1.41181	0.07667	1.51	LILLEY CORNETT WOO	KENTUCKY
16	-91.71	29.93	1.24027	0.22930	1.12	IBERIA	LOUISIANA
17	-70.73	44.11	1.32627	0.05717	1.02	BRIDGTON	MAINE
18	-69.66	45.49	0.97646	0.08161	1.05	GREENVILLE STATION	MAINE
19	-68.26	44.37	0.89500	0.10417	1.10	ACADIA > 11/81	MAINE
20	-68.01	46.87	1.24450	0.15796	0.72	CARIBOU (A)	MAINE
21	-76.15	38.91	1.79560	0.10158	1.62	WYE	MARYLAND
22	-71.21	42.38	1.32401	0.06386	1.10	EAST	MASSACHUSETT
23	-70.02	41.97	1.14583	0.09157	0.98	NACL	MASSACHUSETT
24	-88.55	47.11	1.15342	0.12061	0.84	CHASSELL	MICHIGAN
25	-85.82	44.22	1.23663	0.15086	2.21	WELLSTON	MICHIGAN
26	-88.74	32.33	1.11917	0.10131	1.02	MERIDIAN	MISSISSIPPI
27	-92.20	38.75	1.40430	0.15687	1.18	ASHLAND	MISSOURI
28	-90.32	36.91	1.50611	0.08654	1.41	UNIVERSITY FOREST	MISSOURI
29	-71.70	43.94	1.18629	0.05697	1.61	HUBBARD BROOK	NEW HAMPSHIR
30	-74.85	40.31	1.94808	0.07812	1.88	WASHINGTON XING	NEW JERSEY
31	-79.40	42.30	2.19635	0.10761	2.28	CHAUTAUQUA	NEW YORK
32	-76.66	42.73	2.39853	0.06965	2.05	AURORA	NEW YORK
33	-75.95	43.53	1.82082	0.06752	2.49	BENNETT BRIDGE	NEW YORK
34	-74.22	43.97	2.06935	0.07699	1.41	HUNTINGTON	NEW YORK
35	-74.05	41.35	1.80445	0.07582	2.07	WEST POINT	NEW YORK
36	-80.62	35.70	1.37554	0.08685	1.25	PIEDMONT STATION	NORTH CAROLI
37	-78.60	35.73	1.16725	0.05882	1.12	FINLEY (A)	NORTH CAROLI
38	-78.28	35.02	1.11789	0.07495	1.11	CLINTON STATION	NORTH CAROLI
39	-77.17	36.13	1.24759	0.09462	1.06	LEWISTON	NORTH CAROLI
40	-83.07	40.35	1.70653	0.06805	1.59	DELAWARE	OHIO
41	-81.92	40.78	1.72361	0.06524	1.92	WOOSTER	OHIO
42	-81.53	39.79	1.79228	0.06559	1.55	CALDWELL	OHIO
43	-77.95	40.79	2.42931	0.03002	2.43	PENN STATE	PENNSYLVANIA
44	-77.94	40.66	2.32784	0.03014	2.52	LEADING RIDGE	PENNSYLVANIA
45	-82.84	34.67	1.18577	0.07995	1.62	CLEMSON	SOUTH CAROLI
46	-84.29	35.96	1.35042	0.05886	1.45	WALKER BRANCH	TENNESSEE
47	-83.59	35.66	1.48797	0.05128	1.35	ELKMONT	TENNESSEE
48	-73.16	42.88	1.62328	0.06766	1.80	BENNINGTON	VERMONT
49	-80.95	37.98	1.57511	0.08130	1.61	BABCOCK STATE PARK	WEST VIRGINI
50	-79.66	39.09	1.79344	0.08150	1.92	PARSONS	WEST VIRGINI
51	-91.88	45.82	0.87388	0.13161	0.92	SPOONER	WISCONSIN
52	-89.65	46.05	0.96979	0.06898	0.86	TROUT LAKE	WISCONSIN
53	-89.65	44.66	1.13495	0.09142	1.06	LAKE DUBAY	WISCONSIN

NITRATE CONCENTRATION -- 1981

OBS	LONG	LAT	PRED	VARIANCE	ACTUAL	STATION	STATE	REP
1	-82.20	29.97	0.88185	0.47594	0.83	BRADFORD FOREST	FLORIDA	
2	-84.41	33.18	0.95386	0.21470	0.88	GEORGIA STATION	GEORGIA	
3	-89.27	37.71	1.29118	0.14737	1.33	SOUTHERN ILL U	ILLINOIS	
4	-88.67	37.44	1.31404	0.14272	1.23	DIXON SPRINGS	ILLINOIS	
5	-88.37	40.05	1.63575	0.18867	1.67	BONDVILLE	ILLINOIS	
6	-87.99	41.70	1.92247	0.14425	1.68	ARGONNE	ILLINOIS	
7	-87.09	41.63	1.71598	0.13190	2.17	INDIANA DUNES	INDIANA	*
8	-70.73	44.11	1.17653	0.14342	1.14	BRIDGTON	MAINE	
9	-69.66	45.49	1.03034	0.18065	0.80	GREENVILLE STATION	MAINE	
10	-68.01	46.87	0.89392	0.32665	0.78	CARIBOU (A)	MAINE	
11	-85.39	42.41	1.98405	0.20507	1.83	KELLOGG	MICHIGAN	
12	-93.47	47.53	1.46675	0.36215	1.09	MARCELL	MINNESOTA	
13	-88.74	32.33	0.97390	0.43104	0.74	MERIDIAN	MISSISSIPPI	
14	-71.70	43.94	1.31878	0.14464	1.31	HUBBARD BROOK	NEW HAMPSHIRE	
15	-79.40	42.30	2.02405	0.20048	2.10	CHAUTAUQUA	NEW YORK	
16	-76.66	42.73	1.87239	0.20018	2.25	AURORA	NEW YORK	
17	-74.04	41.35	1.74229	0.18275	1.72	STILWELL LAKE	NEW YORK	
18	-73.50	42.38	1.65671	0.16008	1.80	KNOBIT	NEW YORK	
19	-83.43	35.06	1.10727	0.10951	0.85	COWEETA	NORTH CAROLINA	
20	-80.62	35.70	1.09581	0.16674	1.30	PIEDMONT STATION	NORTH CAROLINA	
21	-78.87	35.90	1.04692	0.07736	0.94	R TRIANGLE INST	NORTH CAROLINA	
22	-78.86	35.90	1.00949	0.07678	1.01	R TRIANGLE PARK	NORTH CAROLINA	
23	-78.68	35.73	0.99222	0.08795	0.99	FINLEY (A)	NORTH CAROLINA	
24	-78.28	35.02	0.96785	0.15414	0.93	CLINTON STATION	NORTH CAROLINA	
25	-77.17	36.13	1.13933	0.19474	0.94	LEWISTON	NORTH CAROLINA	
26	-83.07	40.35	1.85301	0.15380	1.77	DELAWARE	OHIO	
27	-81.92	40.78	1.92129	0.13917	1.83	WOOSTER	OHIO	
28	-81.53	39.79	1.78953	0.14411	2.01	CALDWELL	OHIO	
29	-77.94	40.66	1.92374	0.18443	1.98	LEADING RIDGE	PENNSYLVANIA	
30	-82.84	34.67	0.94646	0.13299	1.24	CLEMSON	SOUTH CAROLINA	
31	-84.29	35.96	1.06097	0.14337	1.21	WALKER BRANCH	TENNESSEE	
32	-83.59	35.66	1.12728	0.11259	0.96	ELKMONT	TENNESSEE	
33	-79.66	39.09	1.72254	0.18116	1.89	PARSONS	WEST VIRGINIA	
34	-91.88	45.82	1.31513	0.26428	1.43	SPOONER	WISCONSIN	

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                          NITRATE CONCENTRATION -- 1982

OBS   LONG     LAT    PRED      VARIANCE   ACTUAL   STATION              STATE              REP

  1  -82.20   29.97   0.71244   0.35691    0.66    BRADFORD FOREST      FLORIDA
  2  -80.70   25.39   0.76114   0.63490    0.55    EVERGLADES NAT. PA   FLORIDA
  3  -84.41   33.18   0.75710   0.23221    0.71    GEORGIA STATION      GEORGIA
  4  -89.27   37.71   1.07903   0.13361    1.02    SOUTHERN ILL U       ILLINOIS
  5  -88.97   38.64   1.15092   0.15786    1.18    SALEM                ILLINOIS
  6  -88.85   41.84   1.45825   0.16476    1.33    NIARC                ILLINOIS
  7  -88.67   37.44   1.04851   0.15130    1.04    DIXON SPRINGS        ILLINOIS
  8  -88.37   40.05   1.34803   0.17828    1.34    BONDVILLE            ILLINOIS
  9  -87.99   41.70   1.40838   0.13440    1.54    ARGONNE              ILLINOIS
 10  -87.09   41.63   1.59304   0.14953    1.66    INDIANA DUNES        INDIANA
 11  -69.66   45.49   1.05265   0.21610    0.96    GREENVILLE STATION   MAINE
 12  -68.01   46.87   1.05904   0.33734    0.70    CARIBOU (A)          MAINE
 13  -71.21   42.38   1.25693   0.15832    1.17    EAST                 MASSACHUSETTS
 14  -70.02   41.97   1.17788   0.21904    1.07    NACL                 MASSACHUSETTS
 15  -85.39   42.41   1.69358   0.20218    1.91    KELLOGG              MICHIGAN
 16  -84.68   45.56   1.57108   0.32593    1.73    DOUGLAS LAKE         MICHIGAN
 17  -93.47   47.53   0.95756   0.24177    0.96    MARCELL              MINNESOTA
 18  -91.49   47.95   1.10651   0.22118    0.85    FERNBERG             MINNESOTA
 19  -88.74   32.33   0.82424   0.41275    0.84    MERIDIAN             MISSISSIPPI
 20  -92.20   38.75   1.13023   0.30166    1.12    ASHLAND              MISSOURI
 21  -90.32   36.91   1.01217   0.19592    1.00    UNIVERSITY FOREST    MISSOURI
 22  -71.70   43.94   1.17349   0.17687    1.55    HUBBARD BROOK        NEW HAMPSHIRE
 23  -79.40   42.30   1.82826   0.20232    1.94    CHAUTAUQUA           NEW YORK
 24  -77.54   42.11   1.98112   0.15306    1.60    JASPER               NEW YORK
 25  -76.66   42.73   1.61559   0.16850    2.10    AURORA               NEW YORK            *
 26  -74.22   43.97   1.59754   0.19496    1.35    HUNTINGTON           NEW YORK
 27  -74.04   41.35   1.56615   0.19411    1.41    STILWELL LAKE        NEW YORK
 28  -73.50   42.38   1.41637   0.13693    1.48    KNOBIT               NEW YORK
 29  -83.43   35.06   0.84201   0.13012    0.59    COWEETA              NORTH CAROLINA
 30  -80.62   35.70   0.95392   0.18456    1.26    PIEDMONT STATION     NORTH CAROLINA
 31  -78.87   35.90   1.06785   0.10152    1.02    R TRIANGLE INST      NORTH CAROLINA
 32  -78.86   35.90   1.03897   0.10104    1.08    R TRIANGLE PARK      NORTH CAROLINA
 33  -78.68   35.73   1.04869   0.11640    1.00    FINLEY (A)           NORTH CAROLINA
 34  -77.17   36.13   1.20448   0.23085    0.97    LEWISTON             NORTH CAROLINA
 35  -83.07   40.35   1.67481   0.17300    1.75    DELAWARE             OHIO
 36  -81.92   40.78   1.75757   0.15850    1.82    WOOSTER              OHIO
 37  -81.53   39.79   1.61854   0.16307    1.67    CALDWELL             OHIO
 38  -77.94   40.66   1.57874   0.19079    2.16    LEADING RIDGE        PENNSYLVANIA        *
 39  -82.84   34.67   0.76903   0.15283    0.86    CLEMSON              SOUTH CAROLINA
 40  -84.29   35.96   0.82630   0.16383    0.97    WALKER BRANCH        TENNESSEE
 41  -83.59   35.66   0.87905   0.13333    0.73    ELKMONT              TENNESSEE
 42  -73.16   42.88   1.42958   0.13602    1.36    BENNINGTON           VERMONT
 43  -79.66   39.09   1.66845   0.20025    1.30    PARSONS              WEST VIRGINIA
 44  -91.88   45.82   1.08062   0.21106    1.12    SPOONER              WISCONSIN
 45  -89.65   46.05   1.23565   0.21320    1.21    TROUT LAKE           WISCONSIN
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                              NITRATE CONCENTRATION -- 1984

OBS    LONG     LAT     PRED      VARIANCE   ACTUAL   STATION                STATE              REP

  1   -87.24   32.46   0.82890   0.08802    0.90    BLACKBELT              ALABAMA
  2   -93.10   34.18   0.90492   0.13411    1.07    CADDO VALLEY           ARKANSAS
  3   -82.28   27.38   0.84801   0.25845    0.79    VERNA WELL FIELD       FLORIDA
  4   -84.41   33.18   0.99806   0.09696    0.79    GEORGIA STATION        GEORGIA
  5   -89.27   37.71   1.17828   0.06169    1.13    SOUTHERN ILL U         ILLINOIS
  6   -88.97   38.64   1.29526   0.06885    1.34    SALEM                  ILLINOIS
  7   -88.85   41.84   1.56706   0.07118    1.42    NIARC                  ILLINOIS
  8   -88.67   37.44   1.17617   0.06705    1.16    DIXON SPRINGS          ILLINOIS
  9   -88.37   40.05   1.51091   0.07364    1.61    BONDVILLE              ILLINOIS
 10   -87.99   41.70   1.62177   0.06157    1.66    ARGONNE                ILLINOIS
 11   -87.09   41.63   1.73808   0.06495    1.78    INDIANA DUNES          INDIANA
 12   -85.99   40.47   1.73382   0.06510    2.03    PURDUE U AG FARM       INDIANA             +
 13   -85.46   40.84   1.90563   0.06577    1.85    HUNTINGTON             INDIANA
 14   -84.96   37.68   1.37622   0.08105    1.26    PERRYVILLE             KENTUCKY
 15   -82.99   37.08   1.23477   0.07277    1.27    LILLEY CORNETT WOO     KENTUCKY
 16   -91.71   29.93   0.86628   0.16619    0.88    IBERIA                 LOUISIANA
 17   -70.73   44.11   1.04899   0.06630    0.93    BRIDGTON               MAINE
 18   -69.66   45.49   0.93179   0.07811    0.89    GREENVILLE STATION     MAINE
 19   -68.26   44.37   0.81135   0.08895    0.77    ACADIA > 11/81         MAINE
 20   -68.01   46.87   0.90349   0.12712    0.81    CARIBOU (A)            MAINE
 21   -76.15   38.91   1.46961   0.08622    1.53    WYE                    MARYLAND
 22   -71.21   42.38   1.09278   0.06965    0.90    EAST                   MASSACHUSETTS
 23   -70.02   41.97   0.99138   0.08710    0.73    NACL                   MASSACHUSETTS
 24   -88.55   47.11   1.30544   0.10433    1.14    CHASSELL               MICHIGAN
 25   -85.82   44.22   1.54206   0.10539    1.98    WELLSTON               MICHIGAN            +
 26   -88.74   32.33   0.92310   0.08970    0.75    MERIDIAN               MISSISSIPPI
 27   -92.20   38.75   1.18686   0.11370    0.99    ASHLAND                MISSOURI
 28   -90.32   36.91   1.07560   0.07892    0.99    UNIVERSITY FOREST      MISSOURI
 29   -71.70   43.94   1.10072   0.06622    1.28    HUBBARD BROOK          NEW HAMPSHIRE
 30   -74.85   40.31   1.60242   0.07758    1.59    WASHINGTON XING        NEW JERSEY
 31   -79.40   42.30   2.09504   0.08847    1.95    CHAUTAUQUA             NEW YORK
 32   -76.66   42.73   1.88662   0.07212    2.06    AURORA                 NEW YORK
 33   -75.95   43.53   1.72510   0.07338    2.02    BENNETT BRIDGE         NEW YORK            +
 34   -74.22   43.97   1.63939   0.07582    1.30    HUNTINGTON             NEW YORK            -
 35   -74.05   41.35   1.52680   0.07441    1.51    WEST POINT             NEW YORK
 36   -80.62   35.70   1.06140   0.07823    1.12    PIEDMONT STATION       NORTH CAROLINA
 37   -78.68   35.73   0.97305   0.06787    0.94    FINLEY (A)             NORTH CAROLINA
 38   -78.28   35.02   0.95712   0.07866    0.84    CLINTON STATION        NORTH CAROLINA
 39   -77.17   36.13   1.09082   0.08507    0.80    LEWISTON               NORTH CAROLINA
 40   -83.07   40.35   1.85485   0.07060    1.99    DELAWARE               OHIO
 41   -81.92   40.78   1.88839   0.07031    2.12    WOOSTER                OHIO
 42   -81.53   39.79   1.76045   0.06863    1.77    CALDWELL               OHIO
 43   -77.95   40.79   1.99490   0.05834    2.14    PENN STATE             PENNSYLVANIA
 44   -77.94   40.66   1.92377   0.05846    2.23    LEADING RIDGE          PENNSYLVANIA        +
 45   -82.84   34.67   0.95451   0.07675    1.22    CLEMSON                SOUTH CAROLINA
 46   -84.29   35.96   1.06868   0.06762    1.14    WALKER BRANCH          TENNESSEE
 47   -83.59   35.66   1.15323   0.06418    0.91    ELKMONT                TENNESSEE
 48   -73.16   42.88   1.32708   0.06916    1.58    BENNINGTON             VERMONT
 49   -80.95   37.98   1.36498   0.07596    1.28    BABCOCK STATE PARK     WEST VIRGINIA
 50   -79.66   39.09   1.65777   0.07561    1.37    PARSONS                WEST VIRGINIA       -
 51   -91.88   45.82   1.15056   0.10741    1.15    SPOONER                WISCONSIN
 52   -89.65   46.05   1.26047   0.07337    1.07    TROUT LAKE             WISCONSIN
 53   -89.65   44.66   1.32679   0.08127    1.31    LAKE DUBAY             WISCONSIN
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NITRATE CONCENTRATION -- 1983

OBS	LONG	LAT	PRED	VARIANCE	ACTUAL	STATION	STATE	REP
1	-92.10	33.60	0.86290	0.24079	0.79	WARREN 2WSW	ARKANSAS	
2	-82.20	29.97	0.67277	0.32314	0.65	BRADFORD FOREST	FLORIDA	
3	-84.41	33.18	0.78893	0.15705	0.65	GEORGIA STATION	GEORGIA	
4	-89.27	37.71	1.07394	0.08565	1.06	SOUTHERN ILL U	ILLINOIS	
5	-88.97	38.64	1.21507	0.11078	1.11	SALEM	ILLINOIS	
6	-88.85	41.84	1.76396	0.10709	1.37	NIARC	ILLINOIS	-
7	-88.67	37.44	1.05576	0.09735	1.02	DIXON SPRINGS	ILLINOIS	
8	-87.99	41.70	1.59040	0.08672	1.93	ARGONNE	ILLINOIS	+
9	-87.09	41.63	1.78666	0.09261	1.81	INDIANA DUNES	INDIANA	
10	-85.99	40.47	1.65876	0.12407	1.59	PURDUE U AG FARM	INDIANA	
11	-69.66	45.49	1.14234	0.24507	0.54	GREENVILLE STATION	MAINE	-
12	-71.21	42.38	1.05463	0.14184	0.83	EAST	MASSACHUSETTS	
13	-85.82	44.22	1.70426	0.12426	1.78	WELLSTON	MICHIGAN	
14	-85.39	42.41	1.72329	0.12022	2.11	KELLOGG	MICHIGAN	+
15	-84.68	45.56	1.68794	0.17215	1.46	DOUGLAS LAKE	MICHIGAN	
16	-93.47	47.53	0.99659	0.16252	1.17	MARCELL	MINNESOTA	
17	-91.49	47.95	1.18542	0.14608	0.80	FERNBERG	MINNESOTA	-
18	-88.74	32.33	0.73002	0.21043	0.66	MERIDIAN	MISSISSIPPI	
19	-92.20	38.75	1.14252	0.19395	1.32	ASHLAND	MISSOURI	
20	-90.32	36.91	1.02232	0.12208	1.04	UNIVERSITY FOREST	MISSOURI	
21	-71.70	43.94	0.93517	0.11722	1.18	HUBBARD BROOK	NEW HAMPSHIRE	
22	-79.40	42.30	1.62633	0.11366	1.81	CHAUTAUQUA	NEW YORK	
23	-77.54	42.11	1.68655	0.09329	1.44	JASPER	NEW YORK	
24	-76.66	42.73	1.61656	0.09521	1.82	AURORA	NEW YORK	
25	-75.95	43.53	1.52354	0.10720	1.96	BENNETT BRIDGE	NEW YORK	+
26	-74.22	43.97	1.48098	0.11441	1.25	HUNTINGTON	NEW YORK	
27	-74.04	41.35	1.30534	0.12968	1.16	STILWELL LAKE	NEW YORK	
28	-73.50	42.38	1.22989	0.08792	1.24	KNOBIT	NEW YORK	
29	-80.62	35.70	1.01681	0.12877	1.09	PIEDMONT STATION	NORTH CAROLINA	
30	-78.68	35.73	1.00006	0.09839	1.12	FINLEY (A)	NORTH CAROLINA	
31	-78.28	35.02	1.07474	0.11405	0.78	CLINTON STATION	NORTH CAROLINA	
32	-77.17	36.13	1.04637	0.14080	1.16	LEWISTON	NORTH CAROLINA	
33	-83.07	40.35	1.68647	0.10946	1.59	DELAWARE	OHIO	
34	-81.92	40.78	1.64922	0.10233	1.73	WOOSTER	OHIO	
35	-81.53	39.79	1.54402	0.10632	1.59	CALDWELL	OHIO	
36	-78.77	41.60	1.65657	0.09158	1.49	KANE	PENNSYLVANIA	
37	-77.94	40.66	1.41928	0.11577	1.64	LEADING RIDGE	PENNSYLVANIA	
38	-82.84	34.67	0.85407	0.12803	0.91	CLEMSON	SOUTH CAROLINA	
39	-84.29	35.96	1.02046	0.14854	0.88	WALKER BRANCH	TENNESSEE	
40	-73.16	42.88	1.20400	0.08730	1.24	BENNINGTON	VERMONT	
41	-79.66	39.09	1.47309	0.13066	1.39	PARSONS	WEST VIRGINIA	
42	-91.88	45.82	1.26232	0.13102	1.34	SPOONER	WISCONSIN	
43	-89.65	46.05	1.41800	0.12071	1.12	TROUT LAKE	WISCONSIN	
44	-89.65	44.66	1.37113	0.12667	1.81	LAKE DUBAY	WISCONSIN	+

HYDROGEN ION DEPOSITION -- 1981

OBS	LONG	LAT	PRED	VARIANCE	ACTUAL	STATION	STATE	REP
1	-82.20	29.97	0.02953	0.00050	0.01740	BRADFORD FOREST	FLORIDA	
2	-84.41	33.18	0.03252	0.00030	0.03020	GEORGIA STATION	GEORGIA	
3	-89.27	37.71	0.04851	0.00027	0.04220	SOUTHERN ILL U	ILLINOIS	
4	-88.67	37.44	0.04389	0.00027	0.05050	DIXON SPRINGS	ILLINOIS	
5	-88.37	40.05	0.04813	0.00028	0.05670	BONDVILLE	ILLINOIS	
6	-87.99	41.70	0.04478	0.00026	0.05090	ARGONNE	ILLINOIS	
7	-87.09	41.63	0.04657	0.00025	0.05030	INDIANA DUNES	INDIANA	
8	-70.73	44.11	0.05376	0.00026	0.04590	BRIDGTON	MAINE	
9	-69.66	45.49	0.04915	0.00029	0.02910	GREENVILLE STATION	MAINE	-
10	-68.01	46.87	0.04169	0.00041	0.03780	CARIBOU (A)	MAINE	
11	-85.39	42.41	0.05296	0.00030	0.03860	KELLOGG	MICHIGAN	
12	-93.47	47.53	0.01490	0.00033	0.00660	MARCELL	MINNESOTA	
13	-91.49	47.95	0.01637	0.00033	0.00844	FERNBERG	MINNESOTA	
14	-88.74	32.33	0.03501	0.00047	0.02020	MERIDIAN	MISSISSIPPI	
15	-71.70	43.94	0.04879	0.00026	0.07000	HUBBARD BROOK	NEW HAMPSHIRE	+
16	-79.40	42.30	0.06275	0.00029	0.06910	CHAUTAUQUA	NEW YORK	
17	-76.66	42.73	0.06497	0.00029	0.07330	AURORA	NEW YORK	
18	-74.04	41.35	0.05842	0.00029	0.07200	STILWELL LAKE	NEW YORK	
19	-73.50	42.38	0.06645	0.00027	0.05490	KNOBIT	NEW YORK	
20	-83.43	35.06	0.04220	0.00022	0.04220	COWEETA	NORTH CAROLINA	
21	-80.62	35.70	0.03794	0.00026	0.04820	PIEDMONT STATION	NORTH CAROLINA	
22	-78.87	35.90	0.03440	0.00020	0.02210	R TRIANGLE INST	NORTH CAROLINA	
23	-78.86	35.90	0.03148	0.00020	0.03130	R TRIANGLE PARK	NORTH CAROLINA	
24	-78.68	35.73	0.03301	0.00021	0.02160	FINLEY (A)	NORTH CAROLINA	
25	-78.28	35.02	0.02801	0.00026	0.03540	CLINTON STATION	NORTH CAROLINA	
26	-77.17	36.13	0.03874	0.00029	0.02320	LEWISTON	NORTH CAROLINA	
27	-83.07	40.35	0.05780	0.00026	0.04680	DELAWARE	OHIO	
28	-81.92	40.78	0.06173	0.00025	0.04910	WOOSTER	OHIO	
29	-81.53	39.79	0.05765	0.00025	0.07410	CALDWELL	OHIO	+
30	-77.94	40.66	0.06755	0.00028	0.06790	LEADING RIDGE	PENNSYLVANIA	
31	-82.84	34.67	0.04060	0.00024	0.03330	CLEMSON	SOUTH CAROLINA	
32	-84.29	35.96	0.04714	0.00025	0.05080	WALKER BRANCH	TENNESSEE	
33	-83.59	35.66	0.04463	0.00023	0.05240	ELKMONT	TENNESSEE	
34	-79.66	39.09	0.05422	0.00027	0.08630	PARSONS	WEST VIRGINIA	+
35	-91.88	45.82	0.02050	0.00033	0.01200	SPOONER	WISCONSIN	

HYDROGEN ION DEPOSITION -- 1982

OBS	LONG	LAT	PRED	VARIANCE	ACTUAL	STATION	STATE	REP
1	-82.20	29.97	0.03188	0.00022	0.03100	BRADFORD FOREST	FLORIDA	
2	-80.70	25.39	0.03537	0.00038	0.01790	EVERGLADES NAT. PA	FLORIDA	
3	-84.41	33.18	0.04036	0.00017	0.03590	GEORGIA STATION	GEORGIA	
4	-89.27	37.71	0.04275	0.00014	0.04450	SOUTHERN ILL U	ILLINOIS	
5	-88.97	38.64	0.04332	0.00015	0.04150	SALEM	ILLINOIS	
6	-88.85	41.84	0.04065	0.00015	0.02630	NIARC	ILLINOIS	-
7	-88.67	37.44	0.04344	0.00015	0.04550	DIXON SPRINGS	ILLINOIS	
8	-88.37	40.05	0.04168	0.00015	0.04160	BONDVILLE	ILLINOIS	
9	-87.99	41.70	0.03723	0.00014	0.05270	ARGONNE	ILLINOIS	+
10	-87.09	41.63	0.04204	0.00014	0.04800	INDIANA DUNES	INDIANA	
11	-69.66	45.49	0.03526	0.00018	0.02470	GREENVILLE STATION	MAINE	
12	-68.01	46.87	0.03421	0.00024	0.02030	CARIBOU (A)	MAINE	
13	-71.21	42.38	0.04414	0.00015	0.04480	EAST	MASSACHUSETTS	
14	-70.02	41.97	0.04075	0.00018	0.05200	NACL	MASSACHUSETTS	
15	-85.39	42.41	0.04447	0.00016	0.04150	KELLOGG	MICHIGAN	
16	-84.68	45.56	0.03494	0.00021	0.03380	DOUGLAS LAKE	MICHIGAN	
17	-93.47	47.53	0.01319	0.00019	0.00834	MARCELL	MINNESOTA	
18	-91.49	47.95	0.01548	0.00018	0.00861	FERNBERG	MINNESOTA	
19	-88.74	32.33	0.03931	0.00025	0.03620	MERIDIAN	MISSISSIPPI	
20	-92.20	38.75	0.04010	0.00021	0.02950	ASHLAND	MISSOURI	
21	-90.32	36.91	0.04103	0.00016	0.03960	UNIVERSITY FOREST	MISSOURI	
22	-71.70	43.94	0.03781	0.00015	0.04670	HUBBARD BROOK	NEW HAMPSHIRE	
23	-79.40	42.30	0.04997	0.00016	0.05760	CHAUTAUQUA	NEW YORK	
24	-77.54	42.11	0.05484	0.00015	0.03640	JASPER	NEW YORK	-
25	-76.66	42.73	0.04793	0.00015	0.04630	AURORA	NEW YORK	
26	-74.22	43.97	0.04145	0.00016	0.04340	HUNTINGTON	NEW YORK	
27	-74.04	41.35	0.04623	0.00016	0.05600	STILWELL LAKE	NEW YORK	
28	-73.50	42.38	0.04666	0.00014	0.03530	KNOBIT	NEW YORK	
29	-83.43	35.06	0.04536	0.00014	0.03690	COWEETA	NORTH CAROLINA	
30	-80.62	35.70	0.04810	0.00015	0.04860	PIEDMONT STATION	NORTH CAROLINA	
31	-78.87	35.90	0.04900	0.00013	0.05050	R TRIANGLE INST	NORTH CAROLINA	
32	-78.86	35.90	0.04620	0.00013	0.05970	R TRIANGLE PARK	NORTH CAROLINA	+
33	-78.60	35.73	0.05061	0.00014	0.03910	FINLEY (A)	NORTH CAROLINA	
34	-77.17	36.13	0.05422	0.00018	0.03730	LEWISTON	NORTH CAROLINA	-
35	-83.07	40.35	0.05547	0.00015	0.04350	DELAWARE	OHIO	
36	-81.92	40.78	0.05451	0.00015	0.05000	WOOSTER	OHIO	
37	-81.53	39.79	0.05541	0.00015	0.06320	CALDWELL	OHIO	
38	-77.94	40.66	0.05365	0.00016	0.07190	LEADING RIDGE	PENNSYLVANIA	+
39	-82.84	34.67	0.04258	0.00015	0.04160	CLEMSON	SOUTH CAROLINA	
40	-84.29	35.96	0.04200	0.00015	0.06770	WALKER BRANCH	TENNESSEE	++
41	-83.59	35.66	0.05026	0.00014	0.03470	ELKMONT	TENNESSEE	-
42	-73.16	42.88	0.04375	0.00014	0.03850	BENNINGTON	VERMONT	
43	-79.66	39.09	0.05570	0.00016	0.07370	PARSONS	WEST VIRGINIA	+
44	-91.88	45.82	0.01904	0.00017	0.01010	SPOONER	WISCONSIN	
45	-89.65	46.05	0.02007	0.00017	0.02230	TROUT LAKE	WISCONSIN	

HYDROGEN ION DEPOSITION -- 1983

OBS	LONG	LAT	PRED	VARIANCE	ACTUAL	STATION	STATE	REP
1	-92.10	33.60	0.02550	0.11973	0.01920	WARREN 2WSW	ARKANSAS	
2	-82.20	29.97	0.02685	0.18358	0.03040	BRADFORD FOREST	FLORIDA	
3	-84.41	33.18	0.03454	0.09447	0.01840	GEORGIA STATION	GEORGIA	
4	-89.27	37.71	0.03814	0.06171	0.03450	SOUTHERN ILL U	ILLINOIS	
5	-88.97	38.64	0.03958	0.06906	0.03900	SALEM	ILLINOIS	
6	-88.85	41.84	0.04010	0.07115	0.03370	NIARC	ILLINOIS	
7	-88.67	37.44	0.03443	0.06787	0.04840	DIXON SPRINGS	ILLINOIS	
8	-88.37	40.05	0.03975	0.07382	0.04770	BONDVILLE	ILLINOIS	
9	-87.99	41.70	0.03750	0.06137	0.04910	ARGONNE	ILLINOIS	
10	-87.09	41.63	0.04440	0.06395	0.03720	INDIANA DUNES	INDIANA	
11	-85.99	40.47	0.04468	0.07734	0.04530	PURDUE U AG FARM	INDIANA	
12	-91.71	29.93	0.02136	0.16957	0.02510	IBERIA	LOUISIANA	
13	-69.66	45.49	0.03823	0.09203	0.02630	GREENVILLE STATION	MAINE	
14	-68.01	46.87	0.03291	0.14052	0.02650	CARIBOU (A)	MAINE	
15	-71.21	42.38	0.04693	0.08858	0.05380	EAST	MASSACHUSETTS	
16	-85.82	44.22	0.03417	0.08078	0.03800	WELLSTON	MICHIGAN	
17	-85.39	42.41	0.04032	0.07763	0.04660	KELLOGG	MICHIGAN	
18	-84.68	45.56	0.03863	0.10637	0.02990	DOUGLAS LAKE	MICHIGAN	
19	-93.47	47.53	0.01199	0.10317	0.00911	MARCELL	MINNESOTA	
20	-91.49	47.95	0.01367	0.09357	0.00890	FERNBERG	MINNESOTA	
21	-88.74	32.33	0.02426	0.11076	0.02670	MERIDIAN	MISSISSIPPI	
22	-92.20	38.75	0.03093	0.11675	0.02560	ASHLAND	MISSOURI	
23	-90.32	36.91	0.03318	0.07927	0.02340	UNIVERSITY FOREST	MISSOURI	
24	-71.70	43.94	0.04197	0.07651	0.04810	HUBBARD BROOK	NEW HAMPSHIRE	
25	-74.85	40.31	0.06364	0.08991	0.05530	WASHINGTON XING	NEW JERSEY	
26	-79.40	42.30	0.06093	0.07530	0.06540	CHAUTAUQUA	NEW YORK	
27	-77.54	42.11	0.06435	0.06442	0.03330	JASPER	NEW YORK	
28	-76.66	42.73	0.05936	0.06582	0.04680	AURORA	NEW YORK	
29	-75.95	43.53	0.04668	0.07231	0.08220	BENNETT BRIDGE	NEW YORK	
30	-74.22	43.97	0.05450	0.07536	0.04350	HUNTINGTON	NEW YORK	
31	-74.04	41.35	0.05046	0.07108	0.07430	STILWELL LAKE	NEW YORK	
32	-73.50	42.38	0.05511	0.06207	0.04280	KNOBIT	NEW YORK	
33	-83.43	35.06	0.03388	0.06569	0.03960	COWEETA	NORTH CAROLINA	
34	-80.62	35.70	0.03222	0.07666	0.03540	PIEDMONT STATION	NORTH CAROLINA	
35	-78.68	35.73	0.03478	0.06748	0.03310	FINLEY (A)	NORTH CAROLINA	
36	-78.28	35.02	0.03385	0.07835	0.03170	CLINTON STATION	NORTH CAROLINA	
37	-77.17	36.13	0.03797	0.08846	0.03870	LEWISTON	NORTH CAROLINA	
38	-83.07	40.35	0.04884	0.07290	0.04330	DELAWARE	OHIO	
39	-81.92	40.78	0.05496	0.06948	0.04810	WOOSTER	OHIO	
40	-81.53	39.79	0.04923	0.07054	0.05870	CALDWELL	OHIO	
41	-78.77	41.60	0.05574	0.06400	0.08140	KANE	PENNSYLVANIA	
42	-77.94	40.66	0.06054	0.07349	0.06470	LEADING RIDGE	PENNSYLVANIA	
43	-82.84	34.67	0.03330	0.06931	0.03590	CLEMSON	SOUTH CAROLINA	
44	-84.29	35.96	0.03709	0.08251	0.03860	WALKER BRANCH	TENNESSEE	
45	-73.16	42.88	0.05038	0.06187	0.04420	BENNINGTON	VERMONT	
46	-80.56	37.33	0.04541	0.07936	0.02190	HORTON'S STATION	VIRGINIA	
47	-79.66	39.09	0.04842	0.07942	0.06260	PARSONS	WEST VIRGINIA	
48	-91.88	45.82	0.01623	0.08419	0.01520	SPOONER	WISCONSIN	
49	-89.65	46.05	0.01916	0.07878	0.01870	TROUT LAKE	WISCONSIN	
50	-89.65	44.66	0.02541	0.08155	0.02110	LAKE DUBAY	WISCONSIN	

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                                     HYDROGEN ION DEPOSITION -- 1984

 OBS     LONG      LAT      PRED       VARIANCE     ACTUAL     STATION                  STATE                REP

   1    -87.24    32.46    0.03198    0.00034    0.02280    BLACKBELT                ALABAMA
   2    -93.10    34.18    0.03130    0.00040    0.03900    CADDO VALLEY             ARKANSAS
   3    -82.28    27.38    0.02159    0.00041    0.01390    VERNA WELL FIELD         FLORIDA
   4    -80.70    25.39    0.02275    0.00046    0.01010    EVERGLADES NAT. PA       FLORIDA
   5    -84.41    33.18    0.03671    0.00034    0.03090    GEORGIA STATION          GEORGIA
   6    -81.97    32.14    0.03397    0.00037    0.02570    BELLVILLE                GEORGIA
   7    -89.27    37.71    0.04420    0.00031    0.05500    SOUTHERN ILL U           ILLINOIS
   8    -88.97    38.64    0.04220    0.00031    0.05850    SALEM                    ILLINOIS
   9    -88.85    41.84    0.03773    0.00032    0.02060    NIARC                    ILLINOIS
  10    -88.67    37.44    0.04513    0.00031    0.06050    DIXON SPRINGS            ILLINOIS
  11    -88.37    40.05    0.04148    0.00031    0.03940    BONDVILLE                ILLINOIS
  12    -87.99    41.70    0.03662    0.00030    0.03720    ARGONNE                  ILLINOIS
  13    -87.09    41.63    0.03931    0.00030    0.03570    INDIANA DUNES            INDIANA
  14    -85.99    40.47    0.04174    0.00031    0.04750    PURDUE U AG FARM         INDIANA
  15    -85.46    40.84    0.04368    0.00031    0.03980    HUNTINGTON               INDIANA
  16    -84.96    37.68    0.05172    0.00032    0.04010    PERRYVILLE               KENTUCKY
  17    -82.99    37.08    0.04879    0.00031    0.05270    LILLEY CORNETT WOO       KENTUCKY
  18    -91.71    29.93    0.02893    0.00040    0.02430    IBERIA                   LOUISIANA
  19    -90.18    30.81    0.02855    0.00036    0.02180    SOUTHEAST                LOUISIANA
  20    -70.73    44.11    0.04195    0.00031    0.03510    BRIDGTON                 MAINE
  21    -69.66    45.49    0.03781    0.00033    0.02930    GREENVILLE STATION       MAINE
  22    -68.26    44.37    0.03586    0.00034    0.03700    ACADIA > 11/81           MAINE
  23    -68.01    46.87    0.03926    0.00040    0.02230    CARIBOU (A)              MAINE
  24    -76.15    38.91    0.05906    0.00034    0.05600    WYE                      MARYLAND
  25    -71.21    42.38    0.04511    0.00031    0.04950    EAST                     MASSACHUSETTS
  26    -70.02    41.97    0.04748    0.00034    0.03150    NACL                     MASSACHUSETTS
  27    -88.55    47.11    0.02119    0.00036    0.01200    CHASSELL                 MICHIGAN
  28    -85.82    44.22    0.02911    0.00036    0.05280    WELLSTON                 MICHIGAN               +
  29    -93.47    47.53    0.01718    0.00041    0.00713    MARCELL                  MINNESOTA
  30    -88.74    32.33    0.03071    0.00034    0.02330    MERIDIAN                 MISSISSIPPI
  31    -92.20    38.75    0.04218    0.00037    0.02490    ASHLAND                  MISSOURI
  32    -90.32    36.91    0.04483    0.00033    0.03330    UNIVERSITY FOREST        MISSOURI
  33    -71.70    43.94    0.04397    0.00031    0.04870    HUBBARD BROOK            NEW HAMPSHIRE
  34    -74.85    40.31    0.06386    0.00033    0.05700    WASHINGTON XING          NEW JERSEY
  35    -79.40    42.30    0.06584    0.00034    0.07460    CHAUTAUQUA               NEW YORK
  36    -76.66    42.73    0.06595    0.00032    0.06280    AURORA                   NEW YORK
  37    -75.95    43.53    0.05998    0.00032    0.06970    BENNETT BRIDGE           NEW YORK
  38    -74.22    43.97    0.05409    0.00032    0.04080    HUNTINGTON               NEW YORK
  39    -74.05    41.35    0.05702    0.00032    0.06560    WEST POINT               NEW YORK
  40    -80.62    35.70    0.04421    0.00032    0.03800    PIEDMONT STATION         NORTH CAROLINA
  41    -78.68    35.73    0.04221    0.00032    0.02950    FINLEY (A)               NORTH CAROLINA
  42    -78.28    35.02    0.03898    0.00033    0.03450    CLINTON STATION          NORTH CAROLINA
  43    -77.17    36.13    0.04637    0.00034    0.03270    LEWISTON                 NORTH CAROLINA
  44    -83.07    40.35    0.05296    0.00031    0.04360    DELAWARE                 OHIO
  45    -81.92    40.78    0.05904    0.00031    0.05500    WOOSTER                  OHIO
  46    -81.53    39.79    0.05806    0.00031    0.06080    CALDWELL                 OHIO
  47    -77.95    40.79    0.06768    0.00030    0.08670    PENN STATE               PENNSYLVANIA           +
  48    -77.94    40.66    0.06911    0.00030    0.08010    LEADING RIDGE            PENNSYLVANIA
  49    -82.84    34.67    0.03933    0.00032    0.05960    CLEMSON                  SOUTH CAROLINA         +
  50    -84.29    35.96    0.04489    0.00031    0.05300    WALKER BRANCH            TENNESSEE
  51    -83.59    35.66    0.04672    0.00031    0.04350    ELKMONT                  TENNESSEE
  52    -73.16    42.88    0.05025    0.00031    0.05610    BENNINGTON               VERMONT
  53    -80.95    37.98    0.05023    0.00032    0.05560    BABCOCK STATE PARK       WEST VIRGINIA
  54    -79.66    39.09    0.05981    0.00032    0.06830    PARSONS                  WEST VIRGINIA
  55    -91.88    45.82    0.01723    0.00035    0.01010    SPOONER                  WISCONSIN
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                         HYDROGEN ION DEPOSITION -- 1984

OBS    LONG      LAT      PRED       VARIANCE    ACTUAL    STATION       STATE      REP

56    -89.65    46.05    0.01949    0.00033     0.0115    TROUT LAKE    WISCONSIN
57    -89.65    44.66    0.02240    0.00033     0.0182    LAKE DUBAY    WISCONSIN
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                                       HYDROGEN ION CONCENTRATION -- 1981

OBS      LONG      LAT      PRED      VARIANCE     ACTUAL     STATION                  STATE               REP

  1    -82.20    29.97    0.02766    0.00040     0.0194     BRADFORD FOREST          FLORIDA
  2    -84.41    33.18    0.03139    0.00019     0.0310     GEORGIA STATION          GEORGIA
  3    -89.27    37.71    0.04550    0.00013     0.0400     SOUTHERN ILL U           ILLINOIS
  4    -88.67    37.44    0.04169    0.00013     0.0447     DIXON SPRINGS            ILLINOIS
  5    -88.37    40.05    0.04797    0.00017     0.0565     BONDVILLE                ILLINOIS
  6    -87.99    41.70    0.04495    0.00013     0.0547     ARGONNE                  ILLINOIS
  7    -87.09    41.63    0.05191    0.00012     0.0462     INDIANA DUNES            INDIANA
  8    -70.73    44.11    0.04074    0.00013     0.0425     BRIDGTON                 MAINE
  9    -69.66    45.49    0.03912    0.00016     0.0256     GREENVILLE STATION       MAINE                -
 10    -68.01    46.87    0.02985    0.00028     0.0319     CARIBOU (A)              MAINE
 11    -85.39    42.41    0.05395    0.00018     0.0458     KELLOGG                  MICHIGAN
 12    -93.47    47.53    0.01374    0.00020     0.0085     MARCELL                  MINNESOTA
 13    -91.49    47.95    0.01523    0.00020     0.0126     FERNBERG                 MINNESOTA
 14    -88.74    32.33    0.03126    0.00037     0.0190     MERIDIAN                 MISSISSIPPI
 15    -71.70    43.94    0.04588    0.00013     0.0462     HUBBARD BROOK            NEW HAMPSHIRE
 16    -79.40    42.30    0.06763    0.00018     0.0672     CHAUTAUQUA               NEW YORK
 17    -76.66    42.73    0.06198    0.00018     0.0770     AURORA                   NEW YORK             +
 18    -74.04    41.35    0.05707    0.00016     0.0612     STILWELL LAKE            NEW YORK
 19    -73.50    42.38    0.05844    0.00014     0.0570     KNOBIT                   NEW YORK
 20    -83.43    35.06    0.04209    0.00010     0.0305     COWEETA                  NORTH CAROLINA       -
 21    -80.62    35.70    0.03654    0.00015     0.0485     PIEDMONT STATION         NORTH CAROLINA
 22    -78.87    35.90    0.03349    0.00007     0.0244     R TRIANGLE INST          NORTH CAROLINA       -
 23    -78.86    35.90    0.02976    0.00007     0.0321     R TRIANGLE PARK          NORTH CAROLINA
 24    -78.68    35.73    0.03085    0.00008     0.0281     FINLEY (A)               NORTH CAROLINA
 25    -78.28    35.02    0.02929    0.00014     0.0313     CLINTON STATION          NORTH CAROLINA
 26    -77.17    36.13    0.03605    0.00017     0.0291     LEWISTON                 NORTH CAROLINA
 27    -83.07    40.35    0.06252    0.00014     0.0594     DELAWARE                 OHIO
 28    -81.92    40.78    0.06688    0.00012     0.0598     WOOSTER                  OHIO
 29    -81.53    39.79    0.06121    0.00013     0.0818     CALDWELL                 OHIO                 +
 30    -77.94    40.66    0.06591    0.00016     0.0704     LEADING RIDGE            PENNSYLVANIA
 31    -82.84    34.67    0.03421    0.00012     0.0448     CLEMSON                  SOUTH CAROLINA
 32    -84.29    35.96    0.03998    0.00013     0.0532     WALKER BRANCH            TENNESSEE            +
 33    -83.59    35.66    0.04509    0.00010     0.0368     ELKMONT                  TENNESSEE
 34    -79.66    39.09    0.06281    0.00016     0.0667     PARSONS                  WEST VIRGINIA
 35    -91.88    45.82    0.02106    0.00021     0.0156     SPOONER                  WISCONSIN
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HYDROGEN ION CONCENTRATION -- 1982

OBS	LONG	LAT	PRED	VARIANCE	ACTUAL	STATION	STATE	REP
1	-82.20	29.97	0.02098	0.00019	0.0206	BRADFORD FOREST	FLORIDA	
2	-80.70	25.39	0.02238	0.00040	0.0111	EVERGLADES NAT. PA	FLORIDA	
3	-84.41	33.18	0.02615	0.00012	0.0261	GEORGIA STATION	GEORGIA	
4	-89.27	37.71	0.03298	0.00007	0.0342	SOUTHERN ILL U	ILLINOIS	
5	-88.97	38.64	0.03668	0.00008	0.0386	SALEM	ILLINOIS	
6	-88.85	41.84	0.04213	0.00008	0.0275	NIARC	ILLINOIS	-
7	-88.67	37.44	0.03568	0.00008	0.0317	DIXON SPRINGS	ILLINOIS	
8	-88.37	40.05	0.03890	0.00009	0.0468	BONDVILLE	ILLINOIS	
9	-87.99	41.70	0.03728	0.00007	0.0493	ARGONNE	ILLINOIS	+
10	-87.09	41.63	0.04638	0.00007	0.0442	INDIANA DUNES	INDIANA	
11	-69.66	45.49	0.03274	0.00011	0.0288	GREENVILLE STATION	MAINE	
12	-68.01	46.87	0.03106	0.00019	0.0215	CARIBOU (A)	MAINE	
13	-71.21	42.38	0.04166	0.00008	0.0466	EAST	MASSACHUSETTS	
14	-70.02	41.97	0.04316	0.00012	0.0388	NACL	MASSACHUSETTS	
15	-85.39	42.41	0.04603	0.00011	0.0487	KELLOGG	MICHIGAN	
16	-84.68	45.56	0.03867	0.00018	0.0386	DOUGLAS LAKE	MICHIGAN	
17	-93.47	47.53	0.01019	0.00013	0.0102	MARCELL	MINNESOTA	
18	-91.49	47.95	0.01481	0.00012	0.0109	FERNBERG	MINNESOTA	
19	-88.74	32.33	0.02654	0.00023	0.0219	MERIDIAN	MISSISSIPPI	
20	-92.20	38.75	0.03149	0.00017	0.0236	ASHLAND	MISSOURI	
21	-90.32	36.91	0.02878	0.00010	0.0291	UNIVERSITY FOREST	MISSOURI	
22	-71.70	43.94	0.03895	0.00009	0.0460	HUBBARD BROOK	NEW HAMPSHIRE	
23	-79.40	42.30	0.05627	0.00011	0.0602	CHAUTAUQUA	NEW YORK	
24	-77.54	42.11	0.06163	0.00008	0.0480	JASPER	NEW YORK	-
25	-76.66	42.73	0.04913	0.00009	0.0622	AURORA	NEW YORK	+
26	-74.22	43.97	0.04839	0.00010	0.0419	HUNTINGTON	NEW YORK	
27	-74.04	41.35	0.05005	0.00010	0.0484	STILWELL LAKE	NEW YORK	
28	-73.50	42.38	0.04693	0.00007	0.0442	KNOBIT	NEW YORK	
29	-83.43	35.06	0.03125	0.00006	0.0213	COWEETA	NORTH CAROLINA	-
30	-80.62	35.70	0.03455	0.00010	0.0446	PIEDMONT STATION	NORTH CAROLINA	+
31	-78.87	35.90	0.03787	0.00005	0.0362	R TRIANGLE INST	NORTH CAROLINA	
32	-78.86	35.90	0.03593	0.00005	0.0399	R TRIANGLE PARK	NORTH CAROLINA	
33	-78.68	35.73	0.03720	0.00006	0.0332	FINLEY (A)	NORTH CAROLINA	
34	-77.17	36.13	0.04112	0.00012	0.0320	LEWISTON	NORTH CAROLINA	
35	-83.07	40.35	0.05581	0.00009	0.0533	DELAWARE	OHIO	
36	-81.92	40.78	0.05799	0.00008	0.0570	WOOSTER	OHIO	
37	-81.53	39.79	0.05350	0.00008	0.0656	CALDWELL	OHIO	+
38	-77.94	40.66	0.05191	0.00010	0.0691	LEADING RIDGE	PENNSYLVANIA	+
39	-82.84	34.67	0.02672	0.00008	0.0331	CLEMSON	SOUTH CAROLINA	
40	-84.29	35.96	0.02736	0.00008	0.0466	WALKER BRANCH	TENNESSEE	++
41	-83.59	35.66	0.03641	0.00007	0.0226	ELKMONT	TENNESSEE	-
42	-73.16	42.88	0.04504	0.00007	0.0443	BENNINGTON	VERMONT	
43	-79.66	39.09	0.05859	0.00010	0.0486	PARSONS	WEST VIRGINIA	
44	-91.88	45.82	0.01668	0.00011	0.0120	SPOONER	WISCONSIN	
45	-89.65	46.05	0.02021	0.00011	0.0213	TROUT LAKE	WISCONSIN	

HYDROGEN ION CONCENTRATION -- 1983

OBS	LONG	LAT	PRED	VARIANCE	ACTUAL	STATION	STATE	REP
1	-92.10	33.60	0.01845	0.00014	0.0145	WARREN 2WSW	ARKANSAS	
2	-82.20	29.97	0.02080	0.00019	0.0192	BRADFORD FOREST	FLORIDA	
3	-84.41	33.18	0.02350	0.00012	0.0152	GEORGIA STATION	GEORGIA	
4	-89.27	37.71	0.03206	0.00009	0.0295	SOUTHERN ILL U	ILLINOIS	
5	-88.97	38.64	0.03511	0.00009	0.0380	SALEM	ILLINOIS	
6	-88.85	41.84	0.04042	0.00010	0.0337	NIARC	ILLINOIS	
7	-88.67	37.44	0.03190	0.00009	0.0330	DIXON SPRINGS	ILLINOIS	
8	-88.37	40.05	0.03854	0.00010	0.0495	BONDVILLE	ILLINOIS	+
9	-87.99	41.70	0.04032	0.00009	0.0436	ARGONNE	ILLINOIS	
10	-87.09	41.63	0.04481	0.00009	0.0398	INDIANA DUNES	INDIANA	
11	-85.99	40.47	0.04558	0.00010	0.0532	PURDUE U AG FARM	INDIANA	
12	-91.71	29.93	0.01477	0.00019	0.0145	IBERIA	LOUISIANA	
13	-69.66	45.49	0.03157	0.00012	0.0181	GREENVILLE STATION	MAINE	-
14	-68.01	46.87	0.02648	0.00016	0.0226	CARIBOU (A)	MAINE	
15	-71.21	42.38	0.03364	0.00011	0.0403	EAST	MASSACHUSETTS	
16	-85.82	44.22	0.03820	0.00010	0.0400	WELLSTON	MICHIGAN	
17	-85.39	42.41	0.04365	0.00010	0.0492	KELLOGG	MICHIGAN	
18	-84.68	45.56	0.04029	0.00013	0.0334	DOUGLAS LAKE	MICHIGAN	
19	-93.47	47.53	0.01561	0.00013	0.0130	MARCELL	MINNESOTA	
20	-91.49	47.95	0.01875	0.00012	0.0100	FERNBERG	MINNESOTA	
21	-88.74	32.33	0.01780	0.00013	0.0150	MERIDIAN	MISSISSIPPI	
22	-92.20	38.75	0.02929	0.00013	0.0247	ASHLAND	MISSOURI	
23	-90.32	36.91	0.02731	0.00010	0.0205	UNIVERSITY FOREST	MISSOURI	
24	-71.70	43.94	0.03338	0.00010	0.0368	HUBBARD BROOK	NEW HAMPSHIRE	
25	-74.85	40.31	0.04631	0.00011	0.0389	WASHINGTON XING	NEW JERSEY	
26	-79.40	42.30	0.05715	0.00010	0.0626	CHAUTAUQUA	NEW YORK	
27	-77.54	42.11	0.05643	0.00009	0.0496	JASPER	NEW YORK	
28	-76.66	42.73	0.05086	0.00009	0.0593	AURORA	NEW YORK	
29	-75.95	43.53	0.04778	0.00010	0.0572	BENNETT BRIDGE	NEW YORK	
30	-74.22	43.97	0.04305	0.00010	0.0368	HUNTINGTON	NEW YORK	
31	-74.04	41.35	0.04165	0.00010	0.0402	STILWELL LAKE	NEW YORK	
32	-73.50	42.38	0.04116	0.00009	0.0353	KNOBIT	NEW YORK	
33	-83.43	35.06	0.02879	0.00009	0.0200	COWEETA	NORTH CAROLINA	
34	-80.62	35.70	0.02812	0.00010	0.0323	PIEDMONT STATION	NORTH CAROLINA	
35	-78.68	35.73	0.03139	0.00009	0.0276	FINLEY (A)	NORTH CAROLINA	
36	-78.28	35.02	0.03035	0.00010	0.0249	CLINTON STATION	NORTH CAROLINA	
37	-77.17	36.13	0.03134	0.00011	0.0369	LEWISTON	NORTH CAROLINA	
38	-83.07	40.35	0.05173	0.00010	0.0496	DELAWARE	OHIO	
39	-81.92	40.78	0.05359	0.00009	0.0559	WOOSTER	OHIO	
40	-81.53	39.79	0.04952	0.00009	0.0568	CALDWELL	OHIO	
41	-78.77	41.60	0.05567	0.00009	0.0636	KANE	PENNSYLVANIA	
42	-77.94	40.66	0.05289	0.00010	0.0558	LEADING RIDGE	PENNSYLVANIA	
43	-82.84	34.67	0.02365	0.00009	0.0300	CLEMSON	SOUTH CAROLINA	
44	-84.29	35.96	0.02788	0.00010	0.0335	WALKER BRANCH	TENNESSEE	
45	-73.16	42.88	0.03892	0.00009	0.0371	BENNINGTON	VERMONT	
46	-80.56	37.33	0.03921	0.00010	0.0241	HORTON'S STATION	VIRGINIA	-
47	-79.66	39.09	0.04568	0.00010	0.0510	PARSONS	WEST VIRGINIA	
48	-91.88	45.82	0.02163	0.00011	0.0167	SPOONER	WISCONSIN	
49	-89.65	46.05	0.02440	0.00010	0.0223	TROUT LAKE	WISCONSIN	
50	-89.65	44.66	0.02725	0.00010	0.0328	LAKE DUBAY	WISCONSIN	

HYDROGEN ION CONCENTRATION -- 1984

OBS	LONG	LAT	PRED	VARIANCE	ACTUAL	STATION	STATE	REP
1	-87.24	32.46	0.02128	0.00009	0.02060	BLACKBELT	ALABAMA	
2	-93.10	34.18	0.01729	0.00018	0.02270	CADDO VALLEY	ARKANSAS	
3	-82.28	27.38	0.01353	0.00015	0.01560	VERNA WELL FIELD	FLORIDA	
4	-80.70	25.39	0.01523	0.00022	0.00950	EVERGLADES NAT. PA	FLORIDA	
5	-84.41	33.18	0.02959	0.00010	0.02790	GEORGIA STATION	GEORGIA	
6	-81.97	32.14	0.02766	0.00013	0.02360	BELLVILLE	GEORGIA	
7	-89.27	37.71	0.03798	0.00005	0.04150	SOUTHERN ILL U	ILLINOIS	
8	-88.97	38.64	0.04101	0.00007	0.04810	SALEM	ILLINOIS	
9	-88.85	41.84	0.03761	0.00007	0.02530	NIARC	ILLINOIS	-
10	-88.67	37.44	0.03985	0.00006	0.04120	DIXON SPRINGS	ILLINOIS	
11	-88.37	40.05	0.04286	0.00008	0.04750	BONDVILLE	ILLINOIS	
12	-87.99	41.70	0.03757	0.00005	0.04020	ARGONNE	ILLINOIS	
13	-87.09	41.63	0.04271	0.00006	0.04740	INDIANA DUNES	INDIANA	
14	-85.99	40.47	0.04635	0.00006	0.05380	PURDUE U AG FARM	INDIANA	
15	-85.46	40.84	0.05263	0.00006	0.04560	HUNTINGTON	INDIANA	
16	-84.96	37.68	0.04557	0.00009	0.03860	PERRYVILLE	KENTUCKY	
17	-82.99	37.08	0.04029	0.00008	0.04420	LILLEY CORNETT WOO	KENTUCKY	
18	-91.71	29.93	0.01530	0.00015	0.01910	IBERIA	LOUISIANA	
19	-90.18	30.81	0.01806	0.00010	0.01490	SOUTHEAST	LOUISIANA	
20	-70.73	44.11	0.03318	0.00006	0.03230	BRIDGTON	MAINE	
21	-69.66	45.49	0.02912	0.00008	0.02480	GREENVILLE STATION	MAINE	
22	-68.26	44.37	0.02471	0.00010	0.02590	ACADIA > 11/81	MAINE	
23	-68.01	46.87	0.02522	0.00016	0.02520	CARIBOU (A)	MAINE	
24	-76.15	38.91	0.04635	0.00010	0.05290	WYE	MARYLAND	
25	-71.21	42.38	0.03408	0.00007	0.04040	EAST	MASSACHUSETTS	
26	-70.02	41.97	0.03745	0.00009	0.02340	NACL	MASSACHUSETTS	-
27	-88.55	47.11	0.02035	0.00011	0.01620	CHASSELL	MICHIGAN	
28	-85.82	44.22	0.03470	0.00013	0.04750	WELLSTON	MICHIGAN	+
29	-93.47	47.53	0.01026	0.00017	0.00945	MARCELL	MINNESOTA	
30	-88.74	32.33	0.01974	0.00009	0.01710	MERIDIAN	MISSISSIPPI	
31	-92.20	38.75	0.02884	0.00015	0.02090	ASHLAND	MISSOURI	
32	-90.32	36.91	0.03287	0.00009	0.02330	UNIVERSITY FOREST	MISSOURI	-
33	-71.70	43.94	0.03604	0.00006	0.03880	HUBBARD BROOK	NEW HAMPSHIRE	
34	-74.85	40.31	0.05330	0.00008	0.04810	WASHINGTON XING	NEW JERSEY	
35	-79.40	42.30	0.06649	0.00010	0.06360	CHAUTAUQUA	NEW YORK	
36	-76.66	42.73	0.05877	0.00007	0.06340	AURORA	NEW YORK	
37	-75.95	43.53	0.05279	0.00007	0.05640	BENNETT BRIDGE	NEW YORK	
38	-74.22	43.97	0.04982	0.00008	0.03750	HUNTINGTON	NEW YORK	-
39	-74.05	41.35	0.04875	0.00008	0.04770	WEST POINT	NEW YORK	
40	-80.62	35.70	0.03406	0.00009	0.03400	PIEDMONT STATION	NORTH CAROLINA	
41	-78.68	35.73	0.02944	0.00006	0.02470	FINLEY (A)	NORTH CAROLINA	
42	-78.28	35.02	0.02484	0.00008	0.02610	CLINTON STATION	NORTH CAROLINA	
43	-77.17	36.13	0.03207	0.00009	0.02440	LEWISTON	NORTH CAROLINA	
44	-83.07	40.35	0.05748	0.00007	0.05430	DELAWARE	OHIO	
45	-81.92	40.78	0.06120	0.00007	0.06090	WOOSTER	OHIO	
46	-81.53	39.79	0.05401	0.00007	0.06920	CALDWELL	OHIO	+
47	-77.95	40.79	0.06703	0.00004	0.07640	PENN STATE	PENNSYLVANIA	+
48	-77.94	40.66	0.07040	0.00004	0.07070	LEADING RIDGE	PENNSYLVANIA	
49	-82.84	34.67	0.03019	0.00008	0.04470	CLEMSON	SOUTH CAROLINA	+
50	-84.29	35.96	0.03411	0.00006	0.04170	WALKER BRANCH	TENNESSEE	
51	-83.59	35.66	0.04163	0.00006	0.02940	ELKMONT	TENNESSEE	-
52	-73.16	42.88	0.04273	0.00007	0.04920	BENNINGTON	VERMONT	
53	-80.95	37.98	0.04715	0.00008	0.04450	BABCOCK STATE PARK	WEST VIRGINIA	
54	-79.66	39.09	0.05762	0.00008	0.04870	PARSONS	WEST VIRGINIA	
55	-91.88	45.82	0.01383	0.00009	0.01260	SPOONER	WISCONSIN	

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HYDROGEN ION CONCENTRATION -- 1984

OBS	LONG	LAT	PRED	VARIANCE	ACTUAL	STATION	STATE	REP
56	-89.65	46.05	0.01826	0.00007	0.0144	TROUT LAKE	WISCONSIN	
57	-89.65	44.66	0.02202	0.00009	0.0224	LAKE DUBAY	WISCONSIN	